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THE BRITISH PSEUDOCOCCIDAE (HOMOPTERA : COCCOIDEA)

D. J. WILLIAMS

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THE BRITISH PSEUDOCOCCIDAE (HOMOPTERA : COCCOIDEA)

BY

D. J. WILLIAMS

(Commonwealth Institute of Entomology)

19 APR 1962

Pp. 1–79 ; 29 *Text-figures*

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THE BRITISH PSEUDOCOCCIDAE (HOMOPTERA : COCCOIDEA)

By D. J. WILLIAMS

SYNOPSIS

This study of the British Pseudococcidae has necessitated changes in nomenclature of many of the 42 species discussed, resulting in new combinations and new synonymy of names. The species are placed in 21 genera, one of which, *Balanococcus*, is described as new. Twenty-eight species are regarded as native and the remainder are found in greenhouses. Four new species are described : *Atrococcus cracens*, *Balanococcus boratynskii*, *Saccharicoccus penium* and *Trionymus orestes*. Illustrations are given of 29 species, the others having been illustrated elsewhere by other authors.

INTRODUCTION

THE British Pseudococcidae or mealy-bugs discussed here were included in the subfamily Dactylopiinae by Newstead (1903) and later by Green in various accounts of the British species. The group is equivalent to the tribe Pseudococcini as defined by Balachowsky (1948) or to the subfamily Pseudococcinae recognized by Borchsenius (1949). In the present work the group is recognized as that defined by Ferris (1950) as the family Pseudococcidae.

HISTORY

Very few mealy-bugs were known from Britain in the last century and about half of these had been described from greenhouses. One in particular, collected in a greenhouse at the Royal Botanic Gardens, Kew, has still not been found in its natural habitat. The first native record seems to be that of *Coccus halophilus* described by J. Hardy in 1868. Towards the end of the century J. Douglas added other names to the British list but it was R. Newstead who first collected this group seriously. In a monograph of British coccids, Newstead (1903) gave descriptions of 12 mealy-bugs, 7 of which were native species.

During the present century E. E. Green was the one most active in this field adding many new records and describing 15 British species as new to science.

The inadequacy of existing descriptions of British Pseudococcidae makes it impossible, except in a few instances, to identify species from the literature with any degree of certainty. This also applies to many species described from the Continent, although in recent years some effort has been made to describe them more fully.

The purpose of this study is to redescribe and illustrate the British Pseudococcidae and to bring together the somewhat scattered records. Particular attention has been given to a work by Borchsenius (1949) revising the species from Russia. In this work 80 are described as new and many others have since been described from that area. Many of the Russian species will doubtless be found in Western Europe and, taking as a guide the frequency of new species recently discovered in Western Russia, it would seem safe to assume that many new ones remain to be discovered in Western Europe and even in Britain.

When some of the continental species are known to be identical with those described here then their names have been reduced to synonyms. On the other hand a number of the British names may have to be sunk when the continental species are redescribed.

Holotypes of the four new species are deposited in the British Museum (Natural History).

GEOGRAPHICAL DISTRIBUTION

The species settled on for discussion are given in the distributional list opposite.

Newstead and Green often recorded species as British merely because they had been collected alive on imported plants. In recent years *Ferrisiana virgata* (Cockerell) and *Dysmicoccus brevipes* (Cockerell), two important cosmopolitan species, have found their way into this country but no records of their establishment are known here. A few species, especially some members of the genera *Pseudococcus* and *Rhizoecus*, have become established in greenhouses throughout the country and for purposes of recognition they are included. Some other greenhouse species are discussed where changes in nomenclature are due or where a redescription will save the species from obscurity.

No original material seems to exist of *Dactylopius theobromae* described by Douglas (1889) and it is impossible to recognize it from the meagre description : the name, therefore, must be regarded as a *nomen dubium*.

Although normally regarded as part of the continental fauna, the mealy-bugs of the Channel Islands are included because, of the 9 species now recorded, all but 3 are known to occur in Britain. The paucity of records from Wales, Scotland and Ireland immediately becomes apparent from the list. This is undoubtedly due to a lack of collecting and when the total number of British species is finally known, these areas will probably have the most interesting and varied fauna. The British records included relate only to specimens actually studied during the course of this work.

MORPHOLOGY

All morphological terms mentioned are based on those used by Ferris (1950, 1953). McKenzie (1960) has given an excellent generalized drawing representing the morphological structures of the family Pseudococcidae. Measurements of the labium refer to the two fused and sclerotized segments constituting the cone. The small basal segment is not included. As pointed out by McKenzie, the presence of a denticle on the claw, although a useful character, is now of less significance in placing a species in the *Phenacoccus* series. Some species are now known with a denticle but which are not typical of this series and others have been described recently with an obvious relationship to the *Phenacoccus* series, yet lack the denticle. One species is described here as *Euripersia europaea* (Newstead) from specimens where the denticle is present or entirely lacking.

Distributional List of the British Pseudococcidae

	England	Wales	Scotland	Ireland	Channel Islands	Other localities
*Antonina crawi**	×		×			Japan, Formosa, U.S.A., Hawaii, France, Russia.
Atrococcus cracens sp. n.	×	×				
A. luffi					×	
A. paludinus	×					
Balanococcus boratynskii sp. n.	×					
B. scirpi	×					
Chnaurococcus subterraneus	×		×			
*Chorizococcus lounsburyi**	×					S. Africa, Kenya, Egypt, Hawaii, U.S.A. Holland.
Dysmicoccus walkeri	×	×	×		×	Spain, France, Germany.
*D. wistariae**	×					Japan, U.S.A.
Euripersia europaea	×				×	Holland, Germany.
E. tomlinii	×				×	Corsica, Germany.
Heliococcus minutus					×	Spain.
Heterococcus pulverarius	×					
*Nipaecoccus nipae**	×		×			Probably cosmopolitan.
Peliococcus balteatus	×					Russia, Sweden, Czechoslovakia.
Phenacoccus aceris	×		×			Palaearctic and Nearctic.
P. interruptus	×					
P. sphagni	×					Holland.
*Planococcus citri**	×					Cosmopolitan.
*Pseudococcus adonidum**	×		×			Cosmopolitan.
P. fragilis	×	×	×		×	Cosmopolitan.
*P. latipes**	×	×	×		×	Probably cosmopolitan.
Rhizoecus albidus	×					France, Germany.
*R. cacticans**	×					North and South America, greenhouses in Germany.
*R. dianthi**	×					
*R. elongatus**	×					Holland.
*R. falcifer**	×			×		Probably cosmopolitan.
R. halophilus	×	×	×	×		
Saccharicoccus penium sp. n.	×					
*Spilococcus cactearum**	×					U.S.A., Mexico, greenhouses in Europe.
*S. filicicola**	×					
Spinococcus calluneti	×					Sweden, Germany, Russia, Czechoslovakia.
Trionymus dactylis	×				×	France.
T. diminutus					×	New Zealand, U.S.A., Russia, Formosa, Italy.
T. newsteadi	×					Germany, Russia, Czechoslovakia.
T. orestes sp. n.	×					
T. perrisii	×		×	×		France, Germany, Russia, Holland.
T. phalaridis	×					Russia.
T. radicum	×	×				Holland.
T. thulensis	×	×				Iceland, France.
T. tomlini	×				×	

* Greenhouse species.

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The writer is grateful to Dr. Harold Morrison of the United States Department of Agriculture, Washington, D.C. for the prompt and generous way he has answered queries, studied specimens submitted to him and given helpful advice. His highly valued opinions on many of the species herein discussed are accepted and included.

Professor H. L. McKenzie of the University of California, Davis, California has co-operated fully in discussing many points of interest and giving the writer valuable information on his latest paper on the Californian mealy-bugs before it was published. His kindness in this respect has been most welcome.

Professor N. S. Borchsenius of the Zoological Institute, Academy of Science of the U.S.S.R., Leningrad, has kindly examined a photograph of the illustration of *Balanococcus scirpi* (Green) and given valuable comments on its relationship to the genus *Kiritshenkella* described by him. He also compared specimens of *Trionymus hibernicus* with Russian specimens of *T. perrisii* for which the writer is deeply indebted.

Dr. A. Reyne of the Zoölogisch Museum, Amsterdam, Holland, kindly made available Dutch specimens of *Trionymus perrisii* and *T. radicum* for which thanks are cordially given.

Particular gratitude is expressed to Dr. K. L. Boratynski of Imperial College, London, who has taken a lively interest in this study since its commencement. Dr. Boratynski has made available his collection of British mealy-bugs, adding many new records and two new species which are described herein. His help and encouragement have been much appreciated.

KEY TO GENERA

1		Legs entirely lacking	***ANTONINA*** Signoret
–		Legs present, although at times reduced in size	2
2		Trilocular pores present somewhere on the body	3
–		Trilocular pores absent, replaced by quinquelocular pores	***HETEROCOCCUS*** Ferris
3	(2)	With some crateriform ducts present, each with the orifice at the apex of a sclerotized prominence and often with one or more setae attached to the base of the duct prominence	***HELIOCOCCUS*** Šulç
–		Without this type of duct	4
4	(3)	With some dorsal body setae spine-like and same size or nearly same size as those of cerarii	5
–		Dorsal body setae never enlarged and spine-like, either slender or minutely lanceolate	6
5	(4)	Quinquelocular disc pores present on venter, claw with a denticle, dorsal cerarii present	***SPINOCOCCUS*** Borchsenius
–		Quinquelocular disc pores absent, claw without a denticle, dorsal spine-like setae not forming cerarii	***NIPAECOCCUS*** Sulç
6	(4)	Dorsal multilocular disc pores present, arranged in clusters of 3–6 and with a minute tubular duct at the centre	***PELIOCOCCUS*** Borchsenius
–		Dorsal multilocular disc pores, if present, not arranged in clusters	7
7	(6)	Oral rim ducts present somewhere on the body	8
–		Oral rim ducts lacking	12
8	(7)	With 17 pairs of cerarii, each possessing slender auxiliary setae in addition to cerarian setae	***PSEUDOCOCCUS*** Westwood

–	With 0–17 pairs of cerarii but only anal lobe pair with auxiliary setae	9
9 (8)	Body content black or blue-black, especially apparent when boiling in potash or lacto-phenol	11
–	Body content never black or blue-black, usually yellow	10
10 (9)	With from 0 to 4 pairs of cerarii present	***CHORIZOCOCCUS*** McKenzie
—	With from 6 to 17 pairs of cerarii present, part of	***SPILOCOCCUS*** Ferris
11 (10)	With 1–7 pairs of cerarii, circulus absent	***ATROCOCCUS*** Goux
—	With at least 9 pairs of cerarii, circulus present, part of	***SPILOCOCCUS*** Ferris
12 (7)	Circulus present, longer than wide, hour-glass shaped	***SACCHARICOCCUS*** Ferris
—	Circulus, if present, never longer than wide or hour-glass shaped	13
13 (12)	With a denticle or tooth, either well developed or small, on the plantar surface of the claw	14
—	Claw without a denticle	15
14 (13)	With 9–18 pairs of cerarii	***PHENACOCCUS*** Cockerell
—	With 2–4 pairs of cerarii, part of	***EURIPERSIA*** Borchsenius
15 (13)	Anal lobes without recognizable cerarii, bi- or tritubular pores present somewhere on the body	***RHIZOECUS*** Künckel d'Herculais
—	Anal lobes with cerarii represented by paired conical setae, bi- or tritubular pores lacking	16
16 (15)	With 18 pairs of cerarii	***PLANOCOCCUS*** Ferris
—	With 1–17 pairs of cerarii	17
17 (16)	With 6–17 pairs of cerarii	***DYSMICOCCUS*** Ferris
—	With 1–5 pairs of cerarii	18
18 (17)	With some quinquelocular pores on venter, part of	***EURIPERSIA*** Borchsenius
—	Never with quinquelocular pores on venter	19
19 (18)	Antennae 7–8-segmented	***TRIONYMUS*** Berg
—	Antennae 6-segmented	20
20 (19)	Multilocular disc pores forming marginal zone around dorsum and venter	***BALANOCOCCUS*** Williams
—	Multilocular disc pores on venter of abdomen only, not forming marginal zone	***CHNAUROCOCCUS*** Ferris

NOTES. Although the key is based mainly on morphological characters some difficulty may be encountered with couplet 9 (8) when identifying specimens already prepared on slides. This is due to our incomplete knowledge of the genera *Chorizococcus*, *Spilococcus* and *Atrococcus* and further discussions are given under these genera.

DESCRIPTIONS OF SPECIES

ANTONINA Signoret

Antonina Signoret, 1875 : 24.
Antonina Signoret, Borchsenius, 1949 : 311.
Antonina Signoret, Ferris, 1953 : 289.

Type of genus *Antonina purpurea* Signoret.

The type of the genus was described from France but the genus is represented mainly in the warmer regions. Only *Antonina crawi* Cockerell is known in this country and this is found in greenhouses. It is mentioned here to synonymize the name *A. socialis* Newstead. All members of this genus are devoid of legs and many have the posterior segments of the abdomen sclerotized at maturity. They are found only on grasses.

Antonina crawi Cockerell

Antonina crawi Cockerell, 1900 : 70.
Antonina socialis Newstead, 1901 : 85 (**syn. n.**).
Antonina socialis Newstead, Newstead, 1903 : 207.
Antonina crawii Cockerell, Ferris, 1953 : 292.

The type of *Antonina socialis* is identical with *A. crawi.* Specimens are at hand from ENGLAND, Hertfordshire, Broxbourne, *Arundinaria japonica,* 26.i.1899 and SCOTLAND, East Lothian, Prestonkirk, on bamboo, ii.1905, all taken under glass. Ferris has redescribed and illustrated this species.

ATROCOCCUS Goux

Atrococcus Goux, 1941 : 69.

Type of genus *Atrococcus melanovirens* Goux.

Goux erected this genus for a few species possessing the following characters : cerarii on abdomen only, circulus absent, oral rim ducts on dorsum and usually on lateral areas of venter, presence of a group of oral collar ducts on prothorax in front of anterior spiracles, these often accompanied by a group of multilocular disc pores, body content showing a black pigment after death and especially when placed in potash.

The black or blue-black body content in mealy-bugs is often a preliminary aid in identification and certainly the character has some significance in such genera as *Nipaecoccus* Šulç, *Naiacoccus* Green and *Amonostherium* Morrison & Morrison and others. There seem to be no special external morphological characters associated with the internal body colour. Once a specimen is mounted on the slide it is, so far, impossible to determine the original body colour.

Two genera, *Spilococcus* Ferris and *Chorizococcus* McKenzie, come very close to *Atrococcus.* The genus *Chorizococcus* has 0–4 pairs of cerarii and *Spilococcus* has 6–17 pairs ; these are the only distinguishing characters. The number of cerarii in *Atrococcus* is 1–7 pairs, combining the characters of the other two genera and, indeed, *Chorizococcus brevicruris* McKenzie with 2 pairs of cerarii and with a noticeable lateral group of tubular ducts and multilocular disc pores on the prothorax could easily be placed in *Atrococcus* except for the absence of the black colour after death. For the purposes of this work the three genera are regarded as distinct but the discovery or redescription of other species in these genera may clarify the position.

The following species, including one from the Channel Islands, may be separated by the key :

1 Cerarii on anal lobes only ; oral rim ducts numerous, about 20 on each tergite . . . **luffi** (Newstead)
– Cerarii 3–7 pairs ; oral rim ducts less numerous, about 6 to each tergite . . . 2
2 Cerarii 3–4 pairs ; noticeable groups of multilocular disc pores in submedian areas of dorsum ; number of multilocular disc pores on prothorax equals or exceeds that of tubular ducts . . . . **cracens** sp. n.
– Cerarii 6–7 pairs ; dorsal multilocular disc pores on margins only of posterior abdominal segments ; multilocular disc pores on prothorax always less in number than tubular ducts . . . . **paludinus** (Green)

Atrococcus cracens sp. n.

(Text-fig. 1)

Pseudococcus paludinus Green, Green, 1934 : 111. (Misidentification.)

Habit and Distribution. External appearance not known although Green has recorded it as forming ovisacs in the angles of prominent leaf veins. Material has been examined from the following localities: England. Surrey: Guildford, *Centaurea nigra*, 21.vii.1922 (E. E. Green). Kent: Bearsted, *Chrysanthemum leucanthemum*, 16.ix.1932 (E. E. Green). Hampshire: Yateley, *Crepis* sp., 25.ix. 1926 (E. E. Green). Berkshire: Silwood Park, *Achillea* sp., 27.vi.1949, (Holotype) *Deschampsia caespitosa*, 27.x.1948, *Veronica* sp., 31.viii.1948 (K. L. Boratynski). Wales. Flintshire: Prestatyn, grass, viii.1918, R. Newstead.

Recognition characters. An ovoid-elliptical species about 2·5 mm. long. Antennae 8-segmented, 355–365 microns long. Legs well developed, slender, posterior coxae with a few translucent pores. Trochanter + femur 225–240 microns, tibia + tarsus 240–260 microns. Labium 95 microns long. Circulus absent. Ostioles present with about 8 trilocular pores and 1 or 2 setae on each lip. Anal ring with 6 setae in length about twice diameter of ring. Cerarii on last 3–4 segments of abdomen only; anal lobe cerarii each with a pair of slender conical setae and a loose group of trilocular pores accompanied by 3–4 auxiliary setae and surrounded by a small area of sclerotization. Anterior cerarii similar but cerarian setae smaller and without auxiliary setae.

Dorsal setae not numerous, all short and slender. Multilocular disc pores in small submarginal groups on the abdominal segments anterior to anal lobes and in noticeable submedian groups on all segments including head except segments IX + X. Tubular ducts with oral collar of two sizes, present in small numbers around the abdominal margins and associated with the submarginal groups of multilocular disc pores. Tubular ducts with oral rim arranged in more or less single transverse rows, a common number being about 8. Trilocular pores present.

Ventral surface with a small elongate area of sclerotization on each anal lobe terminating in an apical seta longer than anal ring setae. Other ventral setae slender but longer than those on dorsum. Multilocular disc pores numerous in double or triple rows at posterior edges of segments V–VIII and at anterior edges of segments VII and VIII, numerous on segments IX + X and in a marginal group containing 15–27 pores opposite each anterior coxa; others present between each pair of coxae. Tubular ducts with oral collar of same two sizes as on dorsum, a larger type, numerous in submarginal groups on the posterior abdominal segment, these often extending to the submedian areas; there being also about 10–15 within each group of multilocular disc pores on prothorax. A smaller type of duct situated mainly in a transverse row on each of posterior abdominal segments. Tubular ducts with oral rim arranged in pairs around the margins of prevulvar abdominal segments and in numbers of 1–4 opposite the spiracles. Trilocular pores not numerous.

Notes. This species may be easily distinguished from others in the genus by the presence of dorsal groups of multilocular disc pores. It comes closest to *A. paludinus* (Green) from which it differs in possessing fewer cerarii and in the larger proportion of multilocular disc pores to tubular ducts opposite the first coxae.

The accompanying illustration has been prepared from material kindly made available by Dr. K. L. Boratynski.

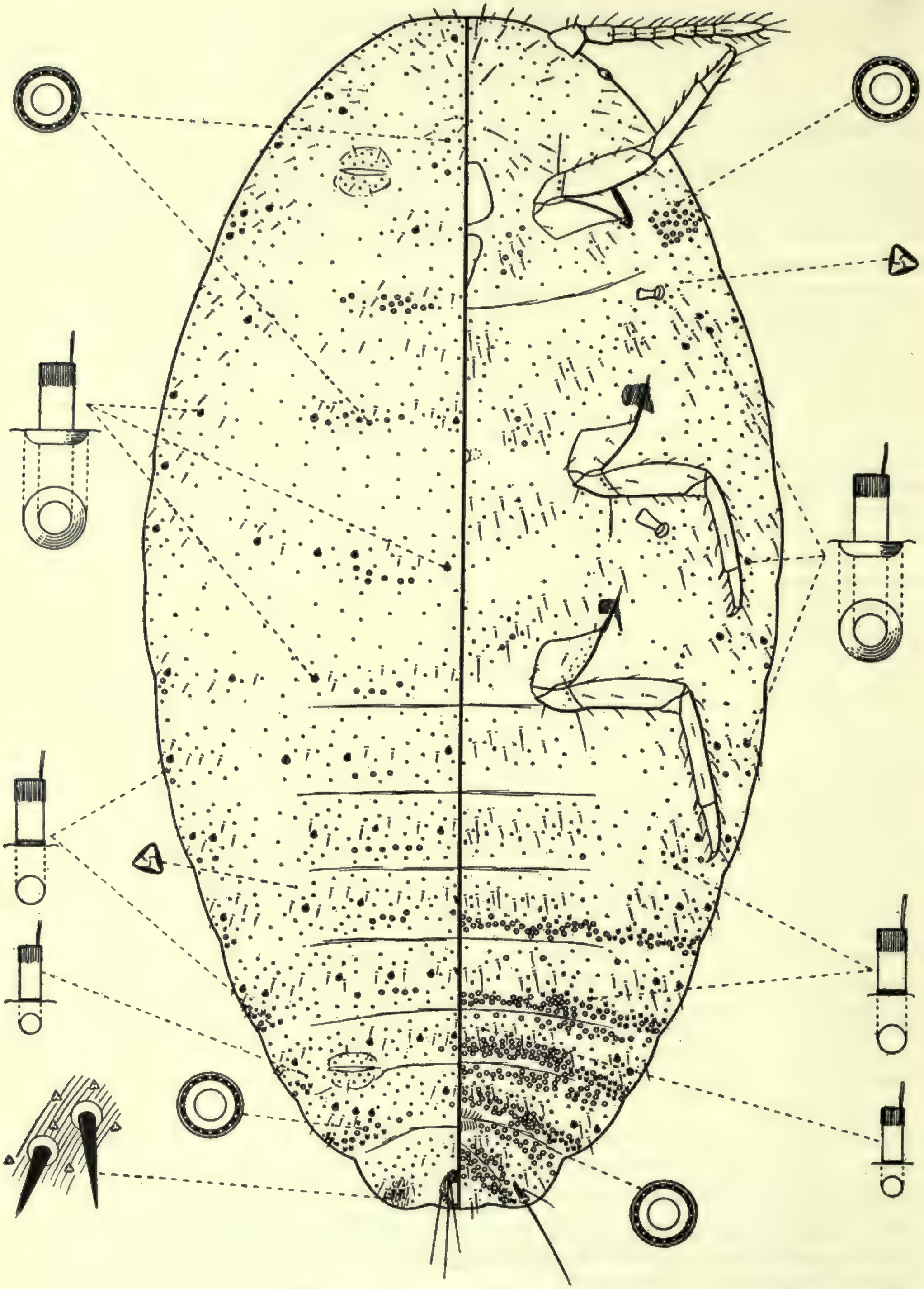

FIG. 1. *Atrococcus cracens* sp. n.

Atrococcus luffi (Newstead) (**comb. n.**)

(Text-fig. 2)

Dactylopius luffi Newstead, 1901 : 85.
Pseudococcus luffi (Newstead), Green, 1925 : 520.

HABIT AND DISTRIBUTION. The ovisac is, apparently, rather closely felted, long, cylindrical, and of equal width throughout ; female remaining uncovered at the cephalic extremity. Newstead did not mention the colour but Green described it as pale flesh-colour, thinly dusted with white mealy powder. All of this material is now black and the specimens become purple-brown or black in potash. Described originally from CHANNEL ISLANDS, Guernsey, on lower stems and roots of *Lepigonum rupestre*, now *Spergularia rupicola*. Other specimens seen, all from Guernsey, are on *Silene maritima*, Petit Bot, Vazon Bay and on *Armeria vulgaris*, Houmet Benest. This is one of the species described from the Channel Islands which so far has not been collected in Britain.

RECOGNITION CHARACTERS. Shape ovoid, about 2·5 mm. long, anal lobes poorly developed. Antennae 8-segmented, about 415 microns long. Labium 115–120 microns long. Legs normal, posterior coxae with a few translucent pores ; trochanter + femur 245–260 microns, tibia + tarsus 260–285 microns. Circulus absent. Ostioles well developed with inner edges of lips sclerotized and a few trilocular pores and an occasional seta on each lip. Anal ring with 6 setae twice length of ring at its greatest diameter. Cerarii represented by a single pair on anal lobes only, each with a pair of slender conical setae and about 8 trilocular pores.

Dorsal setae mainly short and slender, not numerous. Oral rim ducts in more or less single transverse rows on the abdominal segments, a common number being about 20 on each segment ; on the thorax they tend to be in double transverse rows but anteriorly they become scattered. Segments III–VIII with small submarginal groups of multilocular disc pores and tubular ducts with oral collar of two sizes, a larger type usually mingled with the disc pores or just posterior to them and a smaller type just anterior to the groups. Trilocular pores evenly distributed. Simple circular pores, slightly larger than a trilocular pore, present in small numbers.

Ventral surface of each anal lobe with a small area of sclerotization and an apical seta longer than anal ring setae. Ventral setae mainly longer and stouter than those on dorsum. Multilocular disc pores rather numerous in the mid-region of the fourth and posterior segments and in submarginal groups on all abdominal segments but these becoming less numerous anteriorly ; a noticeable submarginal group of about 12 pores also present opposite each anterior coxa. Tubular ducts with oral collar of two sizes and similar to those on dorsum ; a smaller type in transverse rows in the middle of the posterior abdominal segments and a few in the submarginal areas ; a larger type present just anterior to the multilocular disc pores in the mid-region of the abdomen and mingled with the submarginal groups, there being also 3–4 associated with the submarginal groups of disc pores on the prothorax. Tubular ducts with oral rim in small numbers around the submargins of abdomen and on the pro- and mesothorax where they occupy the median areas also. Trilocular pores sparse. Simple circular pores present but not numerous.

Atrococcus paludinus (Green)

(Text-fig. 3)

Pseudococcus paludinus Green, 1921 : 191.
Atrococcus paludinus (Green), Goux, 1941 : 80.

HABIT AND DISTRIBUTION. Described from Wicken Fen, Cambridgeshire, ENGLAND, on the under surface of the foliage of *Eupatorium cannabinum*, *Symphytum*

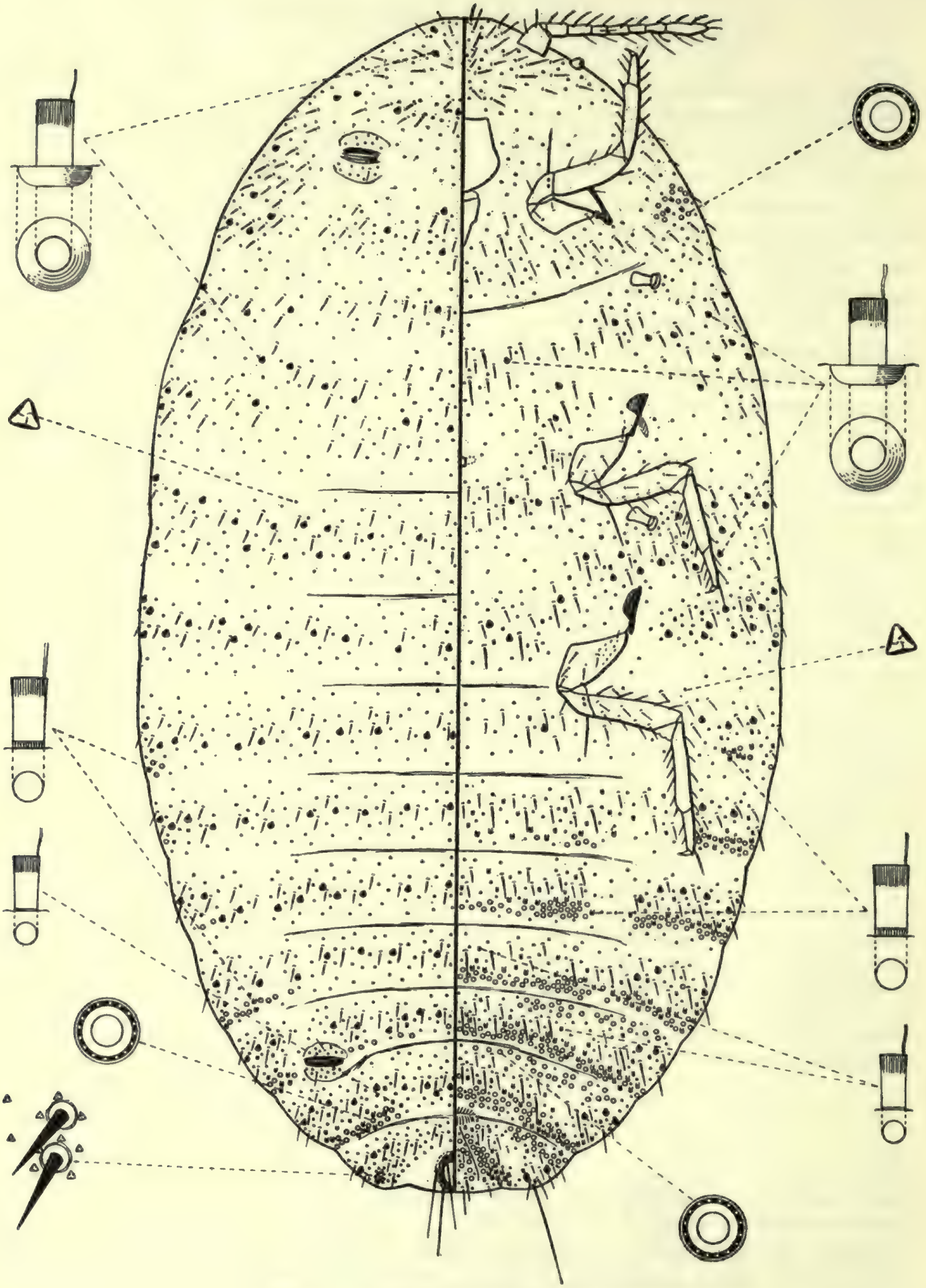

FIG. 2. *Atrococcus luffi* (Newstead).

officinale, *Urtica* sp., *Lysimachia* sp., *Convolvulus* sp., and *Spiraea* sp. This is the only correct record as other specimens collected or recorded under this name are referred to *A. cracens*. Green described the insect as " Adult female brownish pink, masked (on the dorsum) by a thin covering of white pulverulent secretion. Posterior extremity with a pair of short, stout, waxy tassels, with a smaller tassel on the sides of each of the two preceding segments. Younger examples are of a pale olivaceous colour."

RECOGNITION CHARACTERS. An ovoid species attaining a length of 2·5 mm., anal lobes moderately developed. Antennae 8-segmented, 395–475 microns long. Legs slender, well developed, with translucent pores on hind coxae, trochanter + femur 330–370 microns, tibia + tarsus 325–380 microns. Labium 130–140 microns long. Ostioles present, each lip with a few trilocular pores and 1 or 2 setae. Anal ring setae about twice length of diameter of ring. Cerarii numbering 6–7 pairs on posterior abdominal segments only ; anal lobe cerarii, each with a pair of slender conical setae surrounded by a loose group of trilocular pores and a few auxiliary setae. Other cerarii similar but cerarian setae becoming more slender anteriorly and without auxiliary setae.

Dorsal setae short and slender, not numerous. Tubular ducts with oral collar and multilocular disc pores in submarginal groups up to segment IV where they become less numerous ; always with a larger proportion of ducts to pores ; an occasional multilocular disc pore also present in median areas of posterior abdominal segments. Tubular ducts with oral rim on all segments except IX + X, in single transverse rows, a common number being about 6. Trilocular pores evenly distributed.

Ventral surface with a small elongate area of sclerotization on each anal lobe and with a stout apical seta longer than anal ring setae. Ventral setae sparse, all slender but longer than those on dorsum. Multilocular disc pores numerous around margins of second and posterior abdominal segments and abundant in transverse rows on fifth and posterior segments ; a few also present in mid-region of some anterior segments. Another group of 2–8 always present lateral to first coxae, these accompanied by a group of 8–45 tubular ducts with oral collar similar to those on dorsum, the number of ducts although variable, always greater than number of multilocular disc pores. Other tubular ducts numerous in submarginal groups on second and posterior segments ; present also in median areas of some anterior abdominal segments. A smaller type of duct, with oral collar, sparse in median areas of posterior abdominal segments and occasionally near margins. Tubular ducts with oral rim arranged singly or in pairs around the submargins as far anterior as metathorax and a group of 5–6 opposite each first spiracle. Trilocular pores not numerous.

BALANOCOCCUS gen. n.

Type of genus *Ripersia scirpi* Green.

RECOGNITION CHARACTERS. Pseudococcidae with elongate oval body, anal lobes poorly developed. Antennae 6-segmented. Legs normal. Anterior and posterior ostioles present, poorly developed. Circuli present or absent, up to 3 small oval circuli present in one species. Anal ring with a double band of pores and 6 setae. Cerarii numbering 1 or 2 pairs on abdomen only. Tubular ducts with oral collar on dorsum and venter, in zone around body, these of a distinctive shape, the collar flange-shaped and occupying either half or nearly half of total length of duct. Multilocular disc pores forming zone around entire body on both dorsum and venter, and present in transverse rows on abdomen. Trilocular pores evenly distributed.

NOTES. This genus comes closest to *Kiritshenkella* Borchsenius but differs mainly in having the trilocular pores evenly distributed over the body whereas one of the

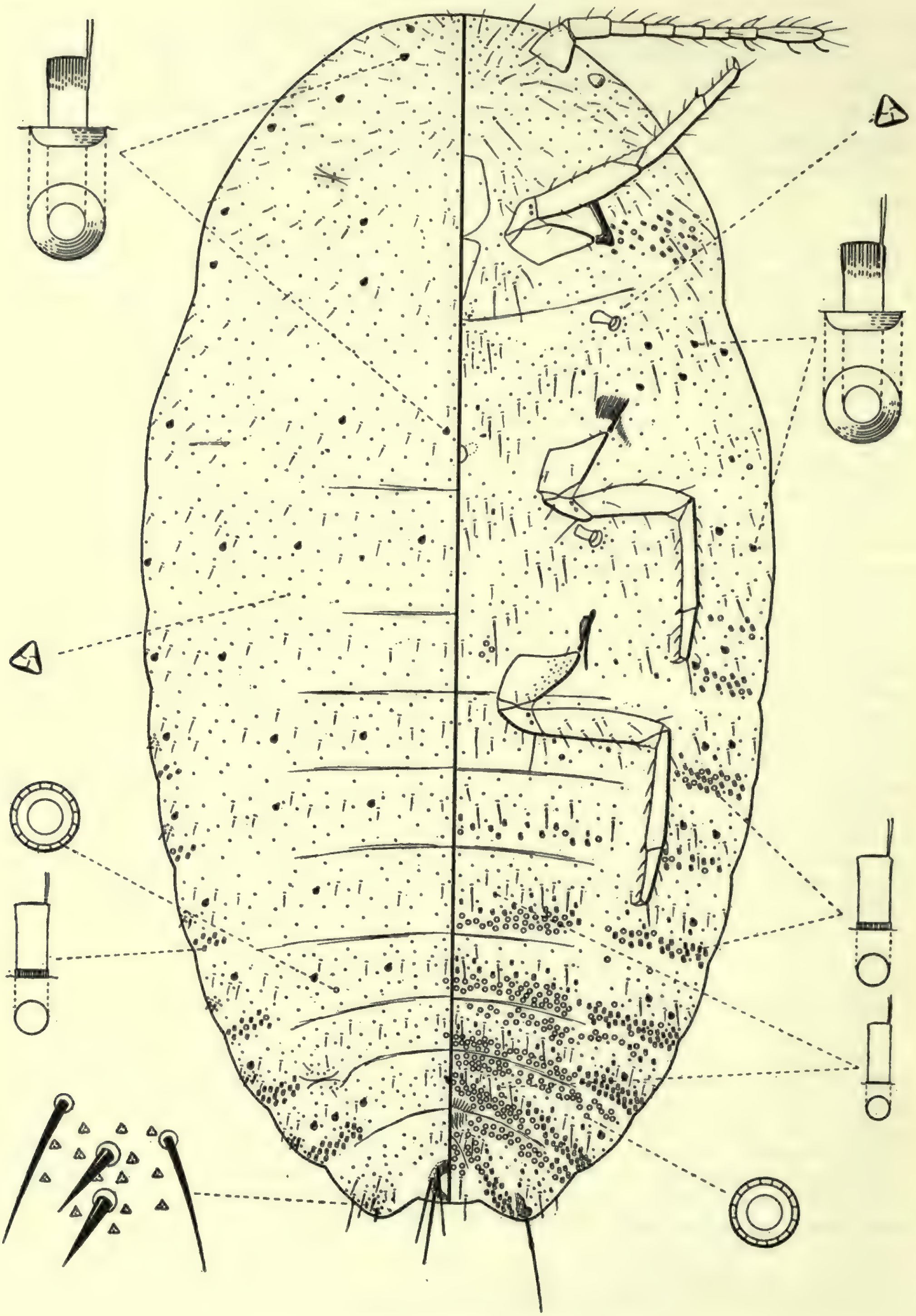

FIG. 3. *Atrococcus paludinus* (Green).

important characters of *Kiritshenkella* is the concentration of trilocular pores on the mid-line of both surfaces. Furthermore, there are in *Kiritshenkella* only posterior ostioles which are well developed, whereas *Balanococcus* possesses 2 pairs and these are poorly developed. Although the tubular ducts of both genera are similar, those of *Kiritshenkella* seem to be much flatter and are described as disc-like.

The writer is much indebted to Professor N. S. Borchsenius for kindly examining a photograph of the accompanying illustration of *B. scirpi* and advising on its differences with *Kiritshenkella*.

The two species of *Balanococcus* may be separated by the following key :

Cerarii present on anal lobes only, circuli absent	***scirpi*** (Green)
Cerarii present on anal lobes and segment VIII, circuli 3 in number .	***boratynskii*** sp. n

Balanococcus boratynskii **sp. n.**

(Text-fig. 4)

HABIT AND DISTRIBUTION. External appearance not known. Found under the leaf sheaths of *Deschampsia caespitosa*, ENGLAND, Berkshire, Silwood Park, 31.v.1945 (K. L. Boratynski).

RECOGNITION CHARACTERS. Body elongate with almost parallel sides, length about 3·5 mm., anal lobes moderately developed. Antennae 6-segmented, 260–310 microns long. Legs rather small and slender, posterior coxae with a few translucent pores ; trochanter + femur 190–220 microns, tibia + tarsus 200–240 microns. Labium 70–75 microns long. Circuli 3 in number, small and oval, the posterior circulus much smaller than others. Ostioles poorly developed with 1–3 trilocular pores on each lip. Cerarii on anal lobes and segment VIII only, anal lobe cerarii, each with a pair of slender conical setae accompanied by 5–6 trilocular pores and a single auxiliary seta. Penultimate cerarii usually with a single conical seta and 1 or 2 trilocular pores. Anal ring with 2 rows of pores and 6 setae about twice length of diameter of ring.

Dorsal surface with rather numerous setae, all short and slender. Trilocular pores with an even distribution. Multilocular disc pores in a marginal zone around entire body, more numerous at anterior and posterior ends ; present also in transverse rows on segments VI–VIII. Tubular ducts short with large oral collar occupying slightly less than half total length of duct. They are interspersed with the multilocular disc pores around the margins and form transverse rows on abdominal segments ; a few scattered on head.

Ventral surface with each apical seta slightly shorter than anal ring setae. Ventral setae similar to those on dorsum but some on head and posterior segments tending to be longer. Trilocular pores evenly distributed. Multilocular disc pores present in a transverse row on segment V and abundant in transverse rows on posterior abdominal segments. Abundant also in a marginal zone around entire body. Tubular ducts of one size only, similar to dorsal ducts, situated in transverse rows on segment V and posterior segments. Present also in a marginal zone among the multilocular disc pores and particularly numerous in marginal groups on segment VI and posterior segments.

The writer has much pleasure in naming this species after Dr. K. L. Boratynski who kindly made available material for study and who has helped in many other ways during the preparation of this work.

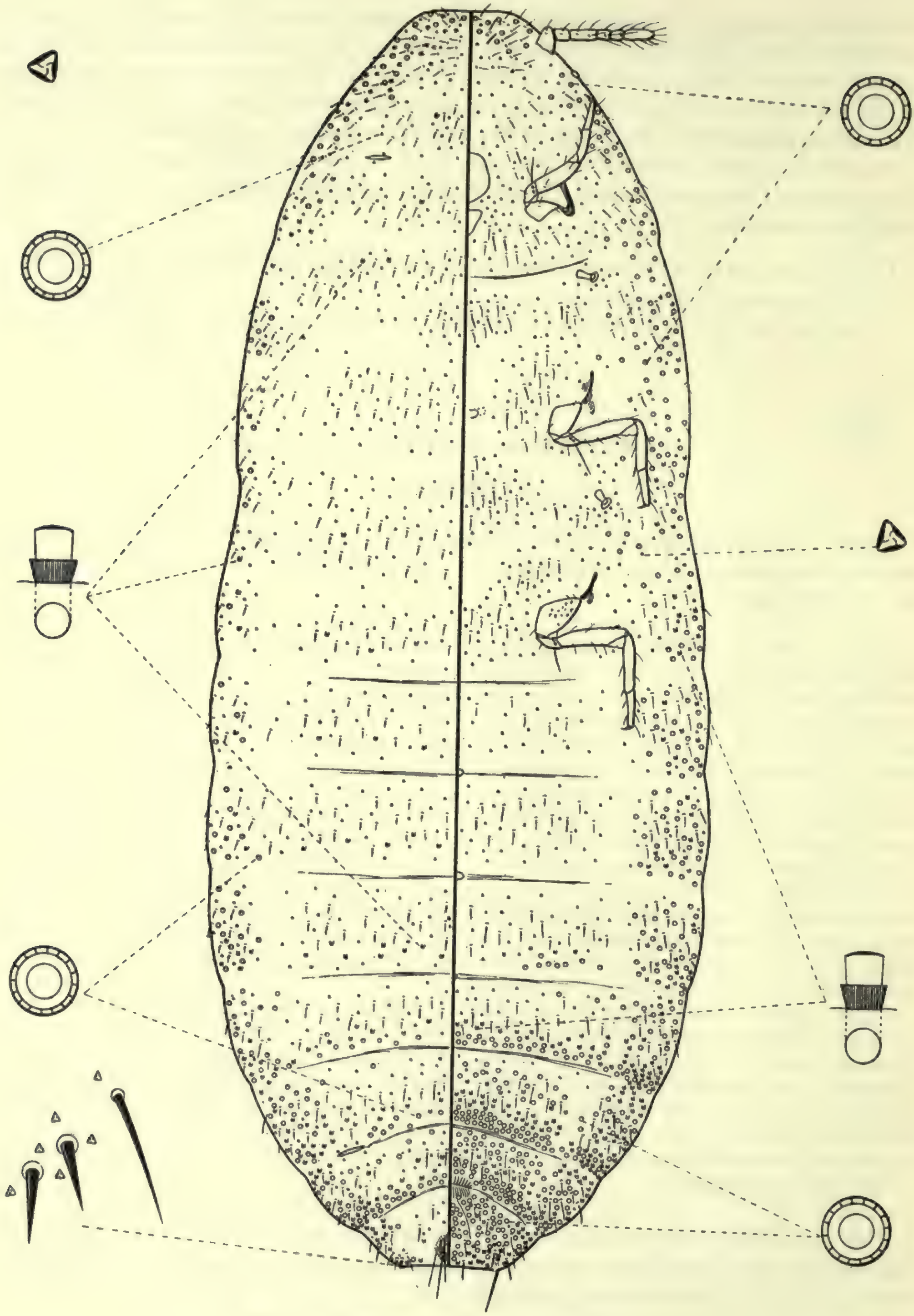

FIG. 4. *Balanococcus boratynskii* sp. n.

Balanococcus scirpi (Green) (**comb. n.**)

(Text-fig. 5)

Ripersia scirpi Green, 1921 : 192.

HABIT AND DISTRIBUTION. This species was described by Green as " Concealed at base of stems of *Scirpus caespitosa* [=*Trichophorum caespitosum*], in boggy ground ; Camberley." [Surrey, ENGLAND.] The adult is apparently pink coloured and concealed beneath a coating of white mealy secretion.

RECOGNITION CHARACTERS. Adult female elongate, sides subparallel, widest across fourth abdominal segment, length approximately 3·5 mm., posterior end rounded. Antennae 6-segmented, 150–190 microns long. Legs small and slender, posterior coxae with a few translucent pores, trochanter + femur about 130 microns, tibia + tarsus 105–130 microns. Labium 50–60 microns long. Anterior and posterior ostioles represented by mere slits without trilocular pores or setae on the lips. Circulus absent. Anal ring with 2 rows of pores and 6 setae about twice as long as diameter of ring. Anal lobe cerarii present only, each with a pair of conical setae set close together and surrounded by about 4 trilocular pores.

Dorsal surface with small pointed setae, not numerous. Trilocular pores sparse but with an even distribution. Multilocular disc pores situated mainly in a narrow zone around the margins, the heaviest concentrations on the head and posterior abdominal segments. Others extending to median areas of segments VI and VII and occasionally in median areas of some anterior segments. Tubular ducts short, oral collar large, occupying about half total length of duct. A few present on head margins, a few on margins of fourth and posterior segments and small concentrations on segments VII–IX where they also occupy the median areas.

Ventral surface with apical setae shorter than anal ring setae. Body setae small and sparse on each segment but tending to be more numerous towards margins. Trilocular pores in transverse groups in median areas. Multilocular disc pores numerous in a submarginal zone around body. They are also scattered on head and form transverse rows on segments VII–IX. Tubular ducts, similar to those on dorsum, situated around body within zone formed by multilocular disc pores. A smaller type of duct but otherwise similar in all respects, confined to median areas of segments VII, VIII and IX + X.

Chnaurococcus Ferris

Chnaurococcus Ferris, 1950 : 40.

Type of genus *Ripersia villosa* Ehrhorn.

This genus was erected for two rotund species each with 6-segmented antennae and with a single pair of cerarii on anal lobes only. The following species seems to belong to this genus although like *C. trifolii* (Forbes), it lacks the dorsal tubular ducts of the type species.

Chnaurococcus subterraneus (Newstead) (**comb. n.**)

(Text-fig. 6)

Ripersia subterranea Newstead, 1893 : 79.
Ripersia tomlinii Newstead, Newstead, 1903 : 187 (in part).
Ripersia subterranea Newstead, Newstead, 1903 : 189.
Ripersia formicarii Newstead, *In* Donisthorpe, 1907 : 5 (**syn. n.**).
Ripersia europaea Newstead, Green, 1921 : 191. (Misidentification.)
Ripersia europaea Newstead, var., Green, 1926 : 183.

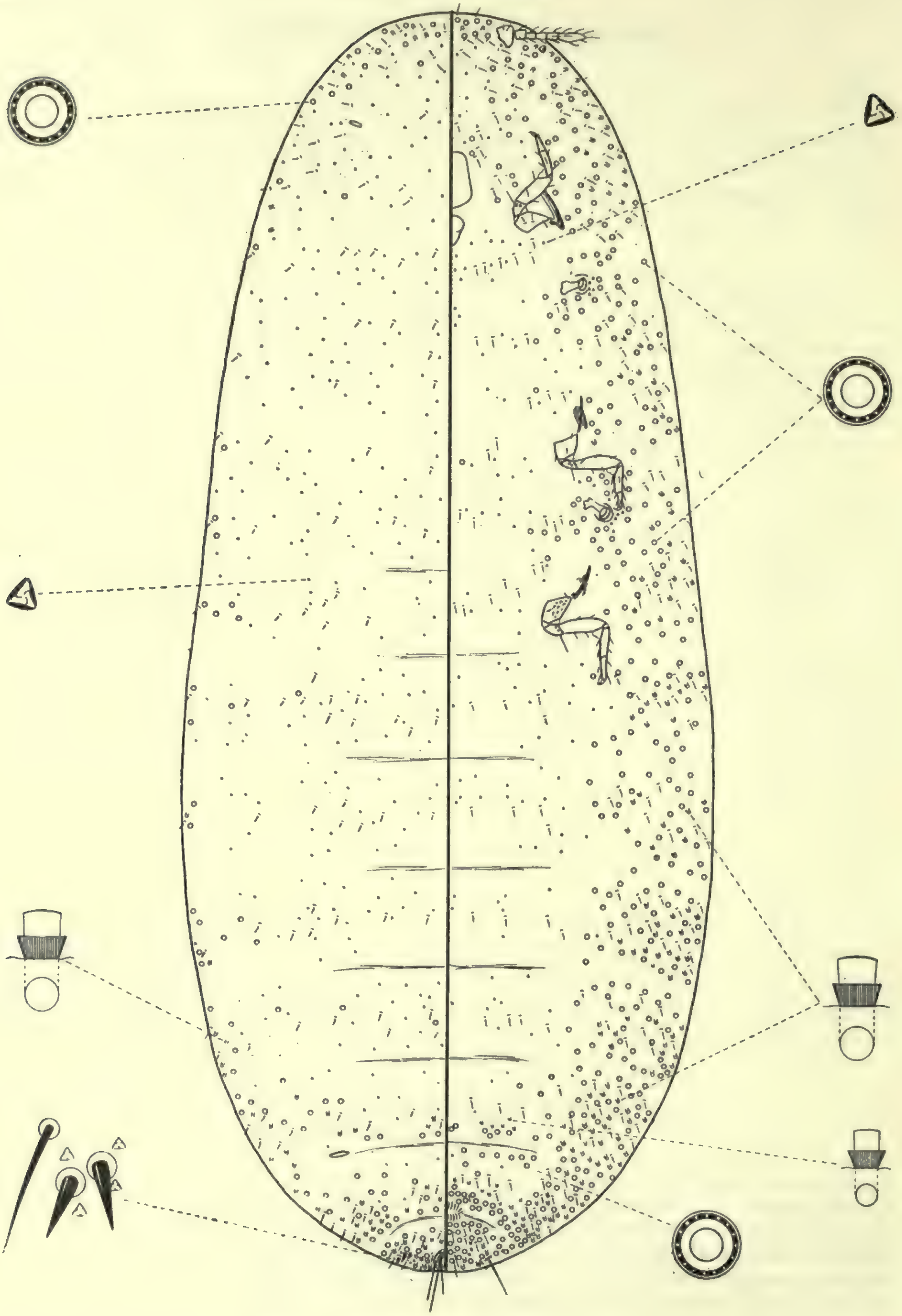

FIG. 5. *Balanococcus scirpi* (Green).

HABIT AND DISTRIBUTION. Newstead described the insect originally as " female adult ; dark red-brown, turns dark purple in caustic potash ". Specimens have been examined from the following localities : ENGLAND. Norfolk : Ingoldisthorpe, King's Lynn, on roots of *Nardus stricta* in nests of *Formica flava* (types). Dorsetshire : Portland, nest of *Lasius niger*. Cornwall : Pudstone, nests of *Lasius niger*, 8.vii.1920 (H. Donisthorpe) ; Stepper Point, vii.1920. Somersetshire : Porlock, nests of *Lasius niger*, v.1915 (W. C. Crawley) ; Minehead, nest of *Lasius niger*, ix.1920 (E. E. Green). Devonshire : Dartmouth, nest of *Lasius niger* (H. Donisthorpe). Gloucestershire : Bristol, in ant's nest, vii.1924 (H. Donisthorpe). Sussex : Eastbourne, nests of *Lasius niger*, 6.xi.1924 (H. Donisthorpe). Kent : Charing, with *Lasius niger* (type of *R. formicarii*). SCOTLAND. East Lothian, North Berwick Law (E. E. Green).

RECOGNITION CHARACTERS. A broadly oval species measuring approximately 2 mm. long ; anal lobes moderately developed. Antennae 6-segmented, 235–260 microns long. Legs small and stout, normal, trochanter + femur 180–190 microns, tibia + tarsus 190–200 microns. Labium 105–115 microns long. Circulus absent. Ostioles well developed, with inner edges of lips sclerotized and each lip with 4–5 trilocular pores and an occasional seta. Anal ring with a double band of pores and 6 setae only slightly longer than diameter of ring. Cerarii represented by a pair on anal lobes only, each with a pair of short conical setae, these usually straight but sometimes curved and surrounded by a loose group of 6–7 trilocular pores.

Dorsal and ventral setae short and mainly rather stout. Apical setae longer than anal ring setae. Trilocular pores somewhat numerous and evenly distributed on both surfaces. Ventral surface with multilocular disc pores on fifth and posterior segments only, in single or slightly irregular transverse rows at posterior edges of segments. Tubular ducts of one size, on venter only, situated in single transverse rows at middle of most abdominal segments and in small submarginal groups.

NOTES. This species comes closest to *C. trifolii* (Forbes), another species found in ants' nests and known from U.S.A., but differs in possessing only 6–7 trilocular pores with each cerarius whereas in *C. trifolii* the numbers of trilocular pores are much more numerous.

CHORIZOCOCCUS McKenzie

Chorizococcus McKenzie, 1960 : 692.

Type of genus *Chorizococcus wilkeyi* McKenzie.

This genus was erected for species with oral rim ducts, the cerarii numbering from 0–4 pairs without auxiliary setae except those on anal lobes. It differs from *Spilococcus* mainly in possessing fewer cerarii but is almost identical with *Atrococcus* discussed earlier. So far as is known, all species of *Spilococcus* are yellow or pinkish but species of *Atrococcus* are black, especially after death, and turn a distinct black or blue-black in potash. For the purposes of this work the genera are regarded as distinct.

Chorizococcus lounsburyi (Brain)

Pseudococcus lounsburyi Brain, 1912 : 179.
Pseudococcus (*Trionymus*) *peregrinus* Green, 1925*a* : 40, 41 (**syn. n.**).
Trionymus lounsburyi (Brain), Ferris, *In* Zimmerman, 1948 : 260, 261.

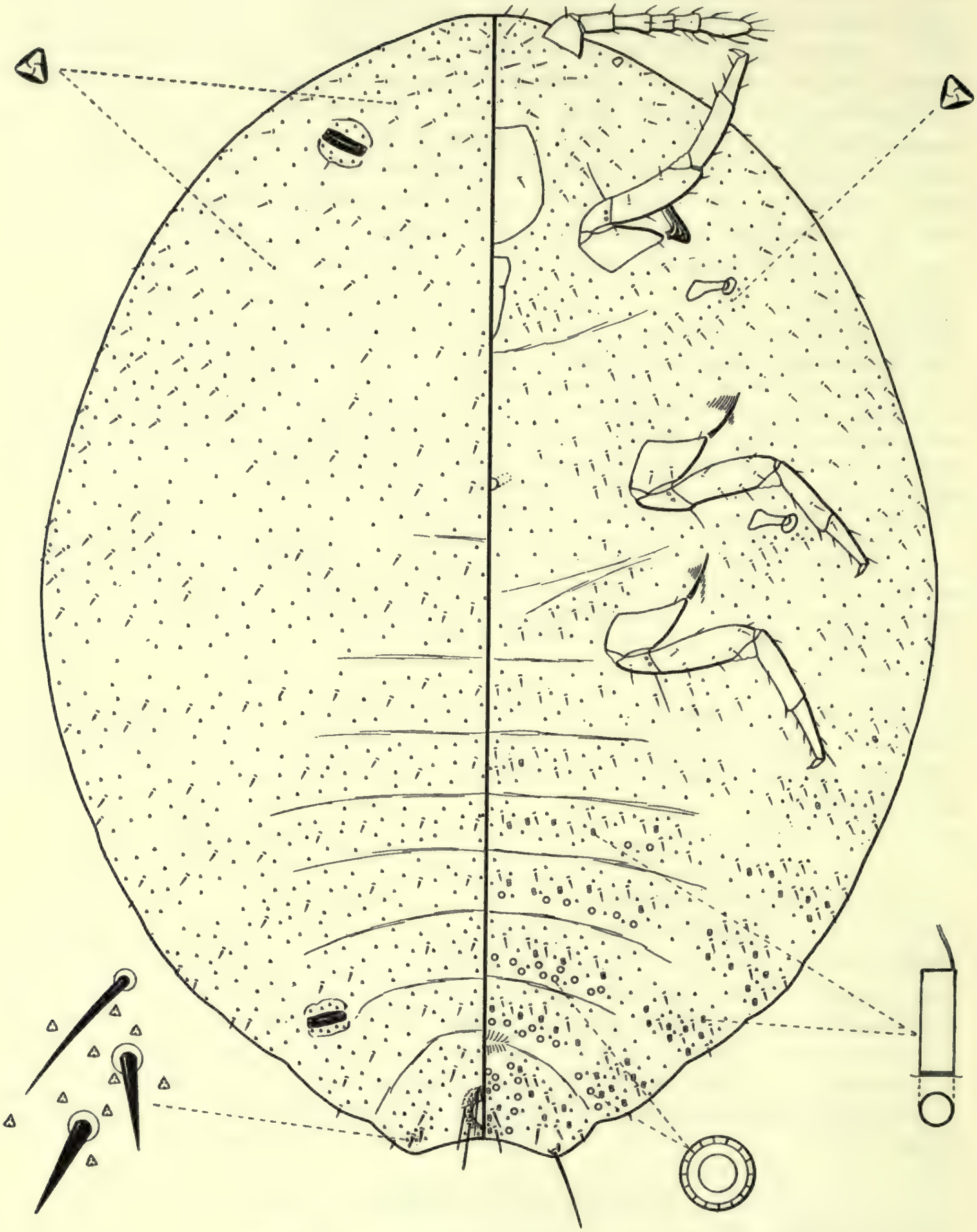

FIG. 6. *Chnaurococcus subterraneus* (Newstead).

Trionymus lounsburyi (Brain), Ferris, 1950 : 271.
Pseudococcus lounsburyi Brain, De Lotto, 1958 : 96, 97.
Chorizococcus peregrinus (Green), McKenzie, 1960 : 701.

This is a difficult species to identify satisfactorily. It has never been figured adequately from the original type material from South Africa and the only illustration available is that prepared by Ferris from material collected in Hawaii. McKenzie has considered, on information received from Dr. H. Morrison, that this material is the same as that described by Green as *Pseudococcus* (*Trionymus*) *peregrinus* and differs from *C. lounsburyi*. This distinction is based mainly on the differences in colour and habit of the adult female. The writer has examined many specimens from South Africa, Egypt, Hawaii, Holland and England and, although there is variation in the numbers of multilocular disc pores and oral rim ducts, there is little evidence that the material represents different species. On a request from the author, Dr. H. Morrison has kindly re-examined material at Washington and has come to similar conclusions, although he has stated that the results must be regarded as tentative until more material is studied. As *C. peregrinus* comes within the known range of variation, the name is sunk as a synonym of *C. lounsburyi*. The variation has also been discussed by De Lotto who has examined many specimens from Africa. For the time being the illustration given by Ferris is accepted although the numbers of multilocular disc pores and oral rim ducts tend to be rather high. As pointed out by De Lotto there are often multilocular disc pores on the posterior dorsal abdominal segments.

Although there are exceptions, most of the records are from the plant families Amaryllidaceae and Liliaceae. Material is at hand from ENGLAND, all under glass, from Hampshire, Exbury, *Nerine* roots (*peregrinus* type) and Surrey, Abinger Hammer, on bulbs of *Crinum* sp., *Sprekelia* sp. and *Hippeastrum* sp. Other material has also been examined from England, without locality, from the bulbs of *Amaryllis* sp.

DYSMICOCCUS Ferris

Dysmicoccus Ferris, 1950 : 53.

Type of genus *Dactylopius brevipes* Cockerell.

The writer has accepted the interpretation of this genus given by McKenzie (1960) and a further discussion is given under *Trionymus*. Only two species recorded from Britain belong to the genus and these may be separated as follows :

Body elongate, multilocular disc pores numerous in transverse rows on posterior abdominal segments of venter	***walkeri*** (Newstead)
Body rotund, multilocular disc pores few, situated around vulva only	***wistariae*** (Green)

Dysmicoccus walkeri (Newstead) (**comb. n.**)

(Text-fig. 7)

Dactylopius walkeri Newstead, 1891 : 164.
Dactylopius walkeri Newstead, Newstead, 1903 : 169.
Pseudococcus walkeri (Newstead), Fernald, 1903 : 112.
Pseudococcus walkeri (Newstead), Green, 1916 : 31.
Pseudococcus walkeri (Newstead), Green, 1925 : 517.

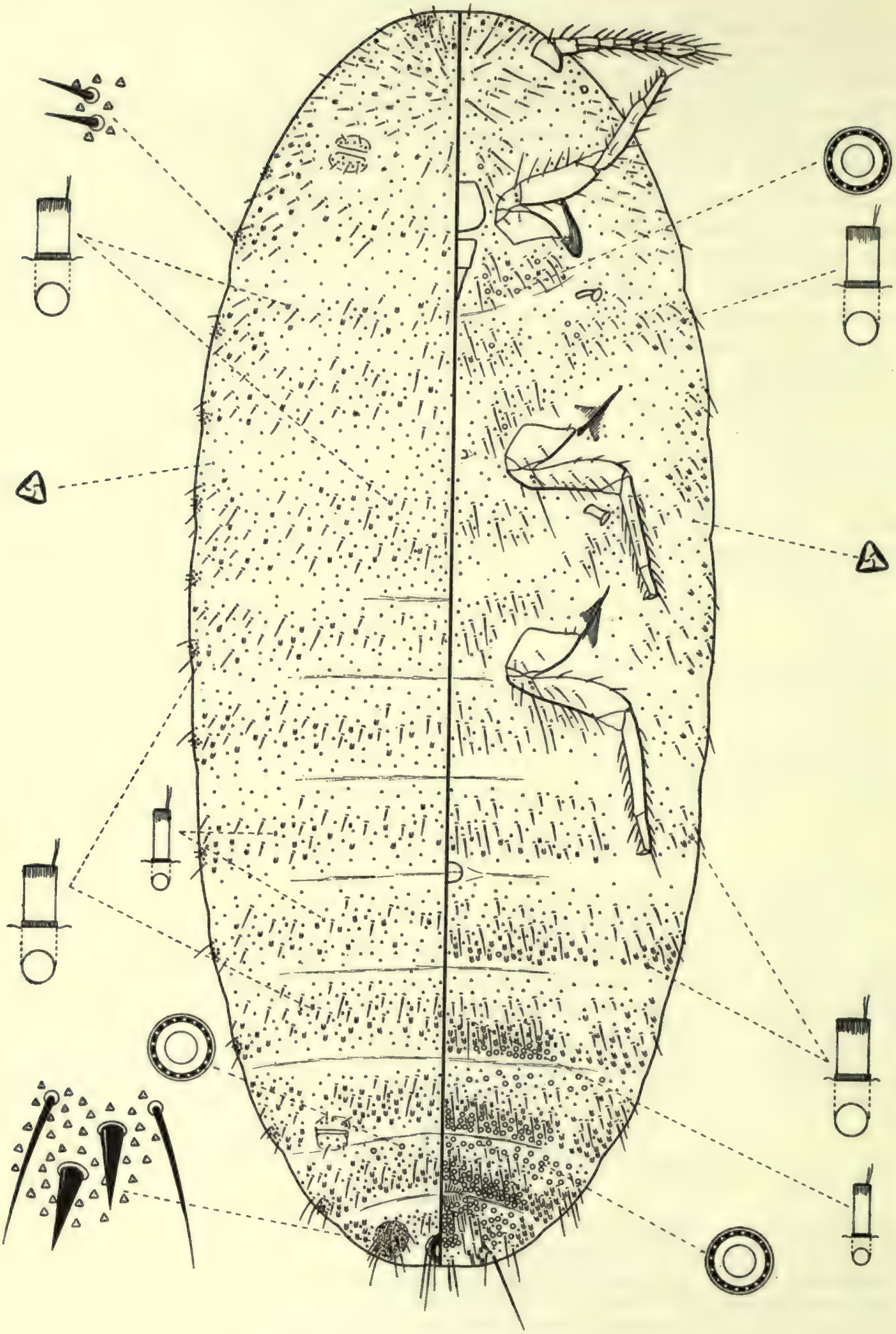

FIG. 7. *Dysmicoccus walkeri* (Newstead).

Pseudococcus walkeri (Newstead), Green, 1926 : 182, 183.
Pseudococcus walkeri (Newstead), Green, 1928 : 30.

HABIT AND DISTRIBUTION. Described as "Elongate brown. Antennae and legs pale yellow-brown, covered with a dense white powder ; the cottony appendages of the margin stout, six of these at the abdominal extremity longer and stouter than the others, the second pair longest and very stout, in length equal to width of body. . . . ". This is normally a grass-infesting species and specimens have been examined from the following localities : ENGLAND. Cheshire : Manley, near base of *Agrostis tenuis*, ix.1890 (R. Newstead). Surrey : Camberley, vii.1915, 13.ix.1920, viii.1922, 5.ix.1922, viii.1926 (*Calluna* sp. stems), 22.viii.1939 (E. E. Green) ; Ashtead, 22.viii.1939. Kent : Bearsted, 14.ix.1926 (E. E. Green). Somersetshire : Cheddar, viii.1926 (E. E. Green). WALES. Brecknockshire : Llangammarch, ix.1925 (E. E. Green). Montgomeryshire : Nant Cwmdu Aberhosan, 20.vii.1919 (R. Newstead). SCOTLAND. East Lothian : Aberlady, viii–1925 (E. E. Green). Aberdeenshire : Monymusk, viii.1920 (F. Laing). CHANNEL ISLANDS. Herm : Petit Bot.

RECOGNITION CHARACTERS. An elongate-oval species measuring up to 4·5 mm. long, anal lobes poorly developed. Antennae 8-segmented, 410–515 microns long. Legs normal, trochanter + femur 370–395 microns, tibia + tarsus 375–440 microns. Labium 125–130 microns long. Circulus not large, rounded. Ostioles with 3–4 trilocular pores and 2–3 setae on each lip. Anal ring with 6 setae twice as long as its diameter. Cerarii numbering 15–17 pairs, usually 15 pairs, those lacking being on the head ; anal lobe cerarii each with a pair of conical setae and numerous trilocular pores accompanied by about 10 auxiliary setae and all borne on a distinct area of sclerotization, larger in area than anal ring. Anterior cerarii each with smaller cerarian setae, a few trilocular pores and one or two auxiliary setae.

Dorsal setae of various sizes but mainly short and slender. One or two multilocular disc pores usually present on penultimate segment. Tubular ducts with oral collar of 2 sizes, a larger type numerous on all segments and a smaller type sparse on some of the posterior abdominal segments. Trilocular pores evenly distributed.

Ventral surface with a small area of sclerotization on each anal lobe terminating at a stout apical seta longer than anal ring setae. Ventral setae rather numerous, all slender but mainly longer than those on dorsum. Multilocular disc pores numerous on posterior abdominal segments, there being double or triple rows on the posterior edges of segments VI–VIII and on the anterior edges of segments VII and VIII ; numerous also on segments IX + X, a few also present behind first coxae, occasionally at random on thorax. Tubular ducts of same sizes as on dorsum, a larger type on fourth and posterior segments and numerous on margins of posterior abdominal segments ; smaller marginal groups present on thorax and head. A smaller type of duct in median areas of fourth and posterior segments only, sparse. Trilocular pores present.

NOTES. This species comes close to *D. timberlakei* (Cockerell), another elongate species on grasses described from U.S.A. and with 17 pairs of cerarii but in this case the circulus is moderately large and divided by a distinct intersegmental furrow. In *D. walkeri* the circulus is oval and not divided.

Dysmicoccus wistariae (Green) (**comb. n.**)

Pseudococcus wistariae Green, 1923 : 218.
Pseudococcus piricola Siraiwa, 1935 : 69 (**syn. n.**).
Pseudococcus cuspidatae Rau, 1937 : 195 (**syn. n.**).
Dysmicoccus cuspidatae (Rau), Ferris, 1950 : 61.
Dysmicoccus piricola (Siraiwa), Takahashi, 1957 : 3.

This species was described from material collected on *Wistaria* sp. at a Japanese nursery garden, presumably under glass, at St. Albans, Hertfordshire, ENGLAND. Dr. Harold Morrison has kindly examined a specimen and he agrees that it is identical with *D. cuspidatae* described from U.S.A. The latter name has already been synonymized by Takahashi with *D. piricola* described from Japan. Ferris has redescribed and illustrated this species under *D. cuspidatae*.

EURIPERSIA Borchsenius

Euripersia Borchsenius, 1948 : 955.

Type of genus *Euripersia amnicola* Borchsenius.

Two British species are included in this genus on the basis of the descriptions of *E. amnicola* Borchs. and *E. brevispina* recently described by Borchsenius & Ter-Gregorian (1956). The essential features of the genus are the oval body ; antennae 6–7-segmented ; claw with a denticle although at times absent ; quinquelocular disc pores usually present on venter although in the type species they are present only in the first stage larva ; cerarii numbering at most 3 pairs, 2 of which confined to segments VIII and IX ; circuli numbering from 1–3 or absent entirely ; multilocular disc pores confined to ventral abdominal segments.

Although the two following species were described originally in the genus *Ripersia*, they are excluded from this genus despite certain similarities to *Ripersia corynephori* Signoret, the type species, redescribed by Reyne (1951). This species has 8-segmented antennae, 2 pairs of cerarii, multilocular disc pores on both dorsum and venter, quinquelocular disc pores absent although present in the first stage larva. As very little else is known about this species and as the following species have no multilocular disc pores on the dorsum, the genus *Ripersia* is disregarded from the present study.

The two British species have been mentioned in the literature under a variety of names and consequently only the original references can be trusted.

Euripersia europaea (Newstead) (**comb. n.**)

(Text-fig. 8)

Ripersia europaea Newstead, 1897 : 167.
Ripersia tomlinii Newstead, Donisthorpe, 1907 : 5. (Misidentification.)
Ripersia tomlinii Newstead, Green, 1920 : 122. (Misidentification.)
Ripersia tomlinii Newstead, Green, 1925 : 518 (in part).
Ripersia wünni Reyne, 1953 : 235–239 (**syn. n.**).

HABIT AND DISTRIBUTION. Newstead described this species as " densely clothed with white mealy wax ; segmentation more or less distinct ". Its most favoured positions are apparently under stones in ants' nests and they presumably feed on the fine rootlets. Specimens are known from Britain as follows : CHANNEL ISLANDS. Guernsey : Watville, ants' nests (B. Tomlin), (*europaea* types) ; Fort Doyle, under stones with ants, 9.ix.1924 (E. E. Green) ; 29.xii.1926, 8.vi.1947 (R. H. Le Pelley) ; also material without data from other localities in nests of *Lasius niger*. ENGLAND. Isle of Wight : Blackgang, with *Lasius flavus* and *L. niger* (H. Donisthorpe) ; Sandown, nest of *Lasius niger*, 4.v.1910 (H. Donisthorpe) ; Ventnor, 26.ix.1922 (H.

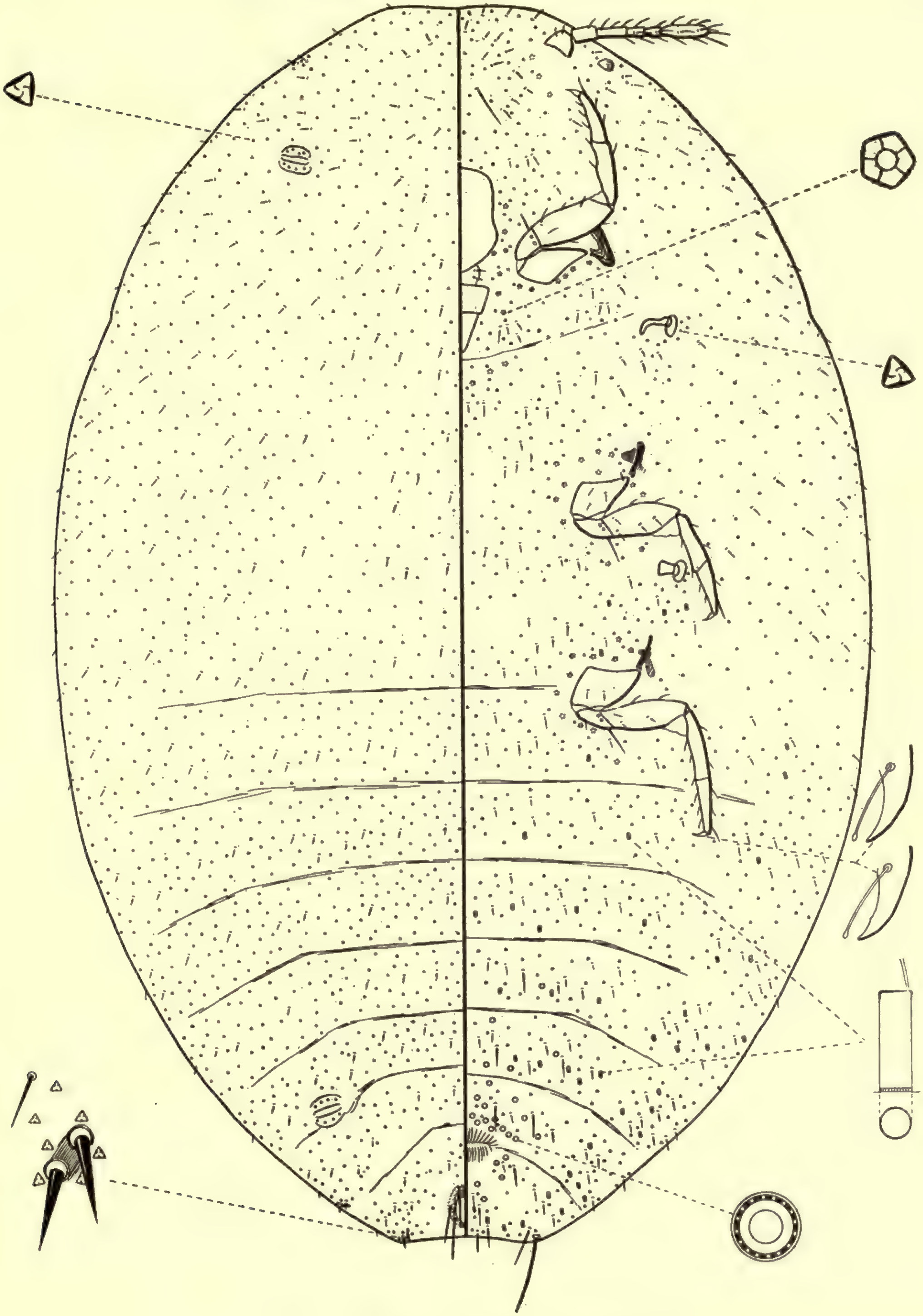

FIG. 8. *Euripersia europaea* (Newstead).

Donisthorpe). Kent: Dover, nest of *Lasius niger* (H. Donisthorpe). Sussex: Eastbourne, with *Lasius niger*, 6.ix.1924 (H. Donisthorpe). Dorsetshire: Swanage, 14.ix.1904 (B. Tomlin). Cornwall: Whitsand Bay, with *Lasius niger* (H. Donisthorpe).

Recognition characters. A small broadly oval species approximately 2·5 mm. long, anal lobes poorly developed. Antennae 6-segmented, 225–260 microns long. Legs small, claw with or without a denticle, in some cases only the faintest sign of a denticle or may be present or absent on different claws of same specimen. Trochanter + femur 155–165 microns, tibia + tarsus 170–205 microns. Labium 90–95 microns long. Circulus absent. Ostioles present, each lip with about 4 trilocular pores but apparently without setae. Anal ring with a double band of pores and 6 setae about same length as ring at its greatest diameter. Cerarii numbering 2–4 pairs; anal lobe cerarii each with 2 slender conical setae and about 5 trilocular pores, the space between the setae lightly sclerotized; penultimate cerarii similar but cerarian setae slightly smaller. The preocular cerarii often present, although difficult to see. Their presence can be detected by the paired setae and the small concentration of trilocular pores. Another pair of cerarii sometimes present on thorax.

Dorsal setae sparse, all small and slender. The only pores present on the dorsum are trilocular, rather numerous with an even distribution.

Ventral surface with a stout pair of apical setae longer than anal ring setae. Ventral setae not numerous, all slender and short but tending to be longer than dorsal setae especially on posterior segments. Multilocular disc pores at anterior and posterior edges of segments VII and VIII and present on segments IX + X, there being scarcely more than 50 altogether. Quinquelocular disc pores present in groups around the basal antennal segments and each coxa. Tubular ducts sparse, of one size only, confined to metathorax and abdomen, forming transverse rows. Trilocular pores of similar distribution to those on dorsum.

Notes. Specimens examined of *Ripersia wünni* Reyne are identical with *E. europaea*. As pointed out by Reyne, the denticle on the claw is, at times, hardly perceptible and in some specimens it is absent entirely.

Euripersia tomlinii (Newstead) (comb. n.)

(Text-fig. 9)

Ripersia tomlinii Newstead, 1892: 146, 147.
Ripersia tomlinii Newstead, Newstead, 1903: 186 (in part).
Ripersia exul Green, 1924: 46, 47 (**syn. n.**).
Ripersia mesnili Balachowsky, 1934: 67–70 (**syn. n.**).
Ripersia exul Green, Green, 1934: 111.

Habit and distribution. Described by Newstead as "Dull orange-yellow, . . . Sac of the female globose or ovate, composed of close, white waxy material, very compact on the inside;" Green described the ovisac as measuring 5 mm. in diameter. The insect lives on grass roots in association with ants' nests. Material has been examined from the following localities: Channel Islands. Guernsey: Moulin Huet, ix.1891 (Miss Tomlin) (Type); Chappelle dom Hué, 24.vii.1923 (J. R. le B. Tomlin (*exul* Type); viii.1958 (R. H. Le Pelley); Vazon Bay, ix.1924 (E. E. Green); Belle Elizabeth; Lihou, ix.1925 (E. E. Green). Herm: ix.1924 (E. E. Green); Rat Is., viii.1923 (J. R. le B. Tomlin). Alderney: viii.1892 (W. A. Luff). Sark: (W. A. Luff). England. Suffolk: ix.1932 (A. S. Watt).

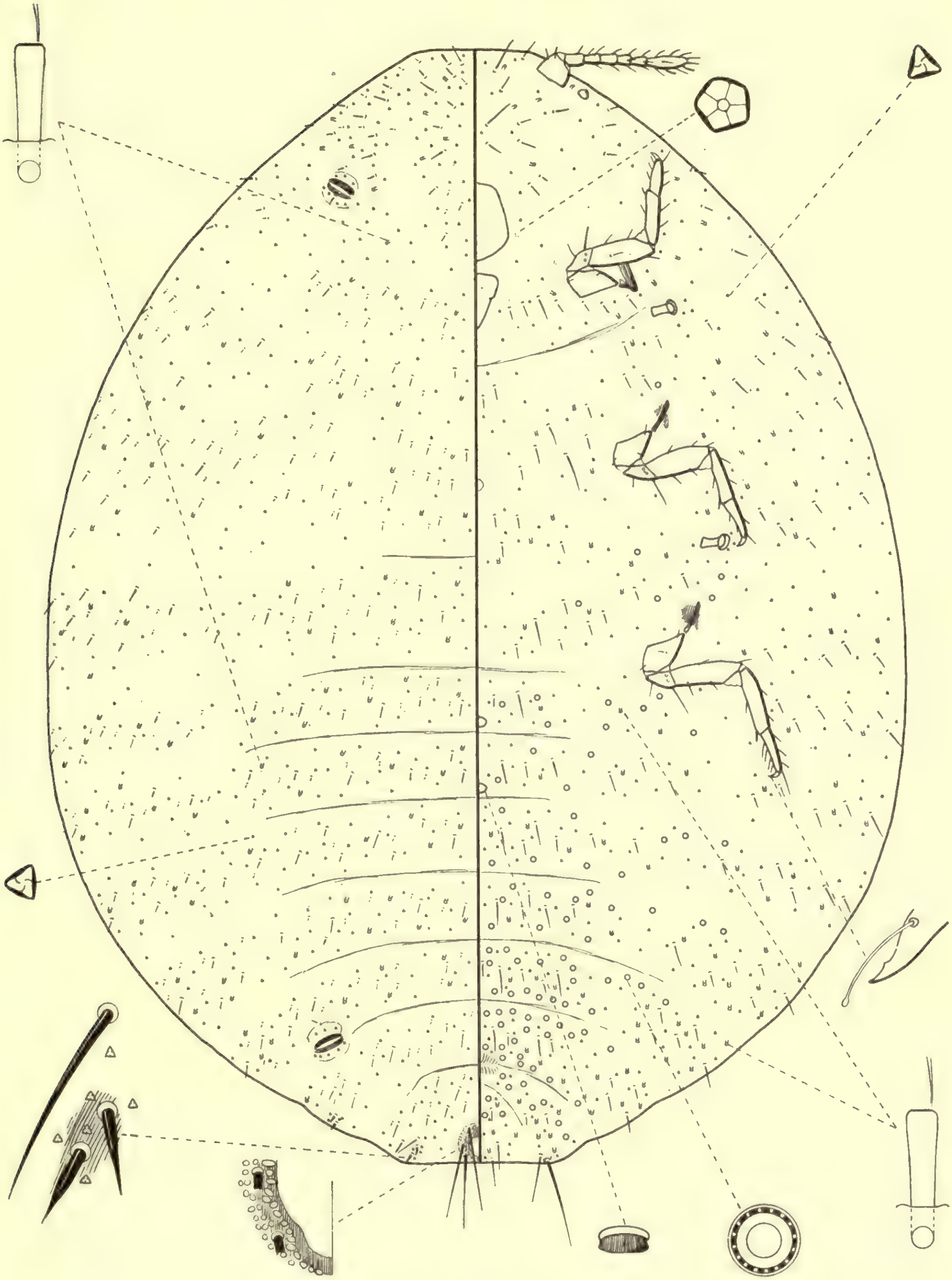

FIG. 9. *Euripersia tomlinii* (Newstead).

Recognition characters. Adult female broadly oval about 3·5 mm. long, anal lobes poorly developed. Antennae 6–7-segmented, 230–260 microns long, the third segment often divided into two of equal length and the terminal segment often showing signs of division. Legs small and slender, claw with a distinct denticle ; trochanter + femur 145–175 microns, tibia + tarsus 170–205 microns. Labium 70–80 microns long. Circuli 2 or 3 in number, on the second, third and fourth segments, all transversely elliptical and with a flat protuberance ; the circulus on the fourth segment much smaller than the others and sometimes absent. Ostioles with inner edges of lips sclerotized and with about 3 trilocular pores and an occasional seta on each lip. Anal ring with 3 rows of pores and 6 setae over twice length of diameter of ring. Cerarii numbering 2 pairs only ; anal lobe cerarii each with a pair of small conical setae and about 5 trilocular pores, the space between the setae sclerotized ; a single auxiliary seta present anterior to the cerarius. Penultimate cerarii similar but cerarian setae smaller.

Dorsal setae not numerous, a short slender type interspersed with a minute lanceolate type. Tubular ducts present each without noticeable collar, situated more or less in single rows at anterior and posterior edges of abdominal segments but scattered on thorax and head ; sparse. Trilocular pores not numerous, evenly distributed.

Ventral surface with apical setae longer than anal ring setae. Ventral setae few, all slender but longer than those on dorsum. Multilocular disc pores arranged in single rows at anterior and posterior edges of abdominal segments, mainly in median areas ; a few also present on thorax. Quinquelocular disc pores present between first coxae and clypeus and labium, usually very few, in which case they may number about 6 but sometimes they are more numerous and may be present on the mesothorax. Tubular ducts similar to those on dorsum, situated between the multilocular disc pores on each of abdominal segments and on the lateral areas ; on the thorax and head they become scattered. Trilocular pores sparse.

Notes. Some confusion seems to have arisen in identifying this species. The third antennal segment is often divided into two segments of equal length and the terminal segment often shows signs of division. When Green described *R. exul* he stated that it differed from *R. tomlinii* in having more robust antennae and a broader and shorter labium. It now seems evident that Green based this distinction on misidentified specimens of *Euripersia europaea*. The type of *R. exul* is identical with *E. tomlinii*.

Specimens of *Ripersia mesnili* Balachowsky, described from Corsica, also seem to be identical with *E. tomlinii*. Balachowsky described the tubular ducts as being on the venter only but they are present on both surfaces on specimens examined from Lac de Nino and Bergeries de Paratella mentioned in his original description. The name *R. mesnili* is, therefore, sunk as a synonym of *E. tomlinii*.

HELIOCOCCUS Šulç

Heliococcus Šulç, 1912 : 39–48.

Type of genus *Heliococcus bohemicus* Šulç.

Since Šulç erected this genus, a few more species were added to it by Goux (1934) and a number of new species have been described by Borchsenius (1949). By far the greatest number occurs in the Palaearctic Region but four are known from North America and one from the Ethiopian Region.

Belonging to the *Phenacoccus* group with a denticle on the claw and with quinquelocular pores, the genus is easily recognized by the peculiar crateriform ducts, the larger ducts often with 1–4 minute setae attached to the base of the duct prominence. The following species seems definitely to belong to this genus.

Heliococcus minutus (Green) **(comb. n.)**

(Text-fig. 10)

Phenacoccus minutus Green, 1925 : 519.

Habit and distribution. Described as clustered on the underground stems of *Erica cinerea*, Channel Islands, Guernsey, L'Ancresse, September. The adult female is described as dull purplish. Body rather closely dusted with coarse mealy secretion. No marginal tassels but with a pair of divaricating liguliform processes projecting from the anal area. This insect has so far not been found in Britain.

Recognition characters. A small oval species measuring approximately 1·5 mm. long, anal lobes well developed, with a dorsal area of weak sclerotization either same size or larger in area than ring. Antennae 9-segmented, 310–370 microns long. Legs normal, claw with a distinct denticle, trochanter + femur 215–220 microns, tibia + tarsus 225–260 microns. Labium 95–105 microns long. Circulus absent. Ostioles present, each with 4–5 trilocular pores, setae often absent, especially on the posterior pair, but usually 2–3 present on each lip of anterior pair. Anal ring with 6 setae about twice length of diameter of ring. Cerarii numbering 18 pairs, each with 2 lanceolate setae ; anal lobe cerarii with a small concentration of about 6–8 trilocular pores ; anterior cerarii with cerarian setae much smaller and accompanied by 3 or 4 trilocular pores.

Dorsal surface with minute lanceolate setae. Trilocular pores not numerous but evenly distributed. Crateriform ducts present, of 3 sizes. The largest type each with 3 minute setae attached to the base of the duct prominence. situated mainly on the mid-line and around the submargins but their positions not constant. An intermediate type, usually with 2 setae attached to the base of the duct prominence, situated mainly in the submedian areas. Both types often occupying similar positions in different specimens. A small type of duct usually present on the margins and occasionally in the submedian areas, these very sparse, without setae attached to the base of the duct prominence but often a single seta in close association with it.

Ventral surface with a pair of stout apical setae longer than anal ring setae. Anal lobes each with a small elongate strip of sclerotization, not attached to the apical seta. Ventral setae slender and sparse but a few lanceolate setae, similar to those on dorsum, occupying the lateral areas. Multilocular disc pores confined to fifth and posterior segments, very few and present in the median areas at posterior edges of segments. Quinquelocular disc pores in median and submedian areas, scattered on head and thorax, but lying in transverse rows on abdominal segments mainly at anterior edges. Trilocular pores sparse. Tubular ducts with oral collar on abdomen and occasionally on metathorax, situated in single transverse rows but absent in submarginal areas, there being scarcely more than 20 altogether. A few crateriform ducts of the same size as the smallest type on dorsum, present around margins of metathorax and some of abdominal segments.

HETEROCOCCUS Ferris

Heterococcus Ferris, 1918 : 65.
Heterococcus Ferris, Morrison, 1945 : 45.

Type of genus *Heterococcus arenae* Ferris.

The important characters of this genus are the 8–9-segmented antennae, claw usually with a denticle, and the presence of quinquelocular disc pores on the dorsum and venter which replace the normal trilocular pores. All the species are found at the bases of grass stems and only one species is known from Britain.

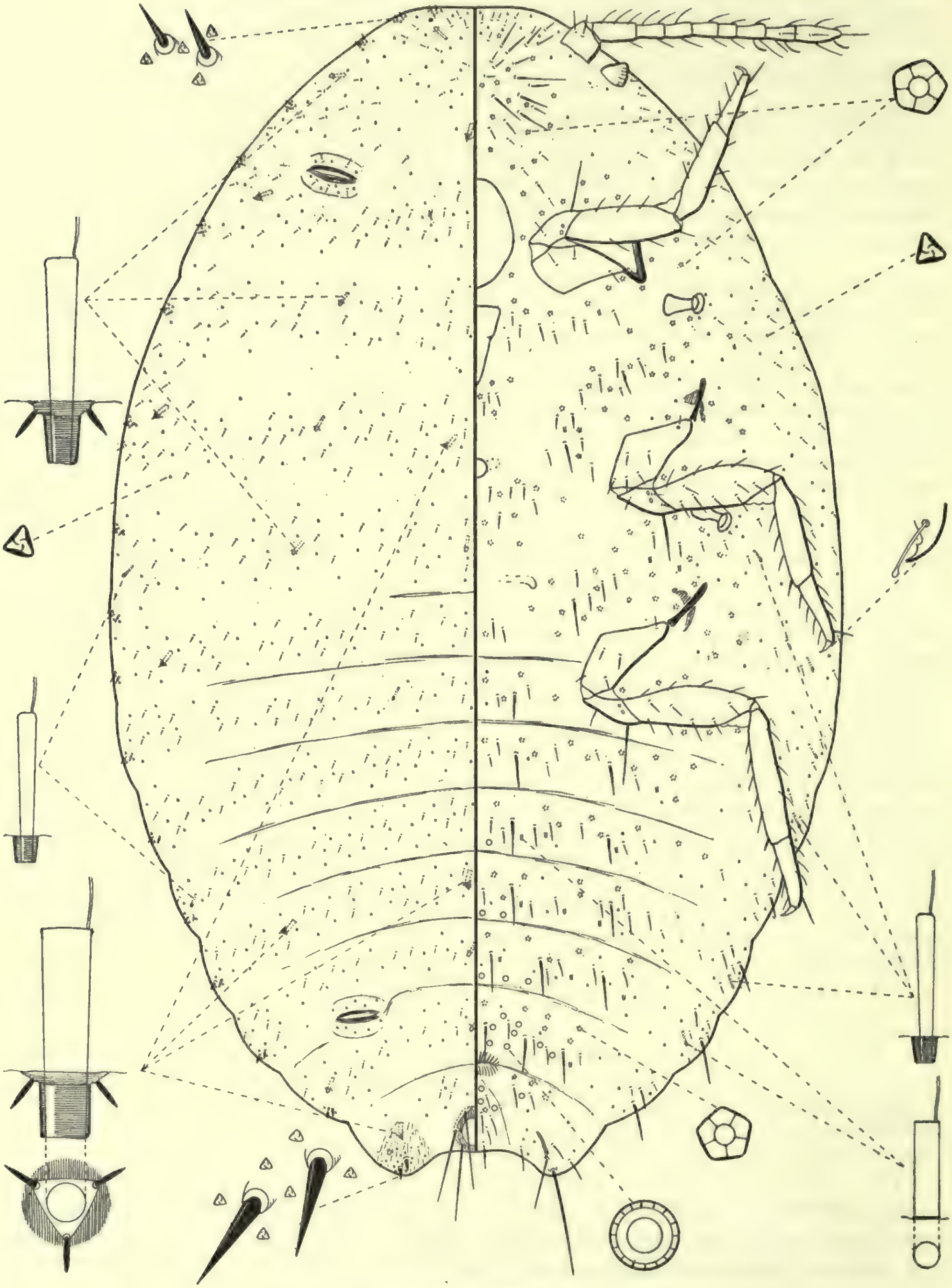

FIG. 10. *Heliococcus minutus* (Green).

Heterococcus pulverarius (Newstead)

Ripersia pulveraria Newstead, 1892 : 145.
Phenacoccus nudus Green, 1926 : 172.
Heterococcus nudus (Green), Green, 1928 : 21.
Heterococcus pulverarius (Newstead), Williams, 1961 : 673.

The name has been given in error to a few species here discussed under *Trionymus*. A redescription and illustration has been given recently by Williams.

ENGLAND. Cheshire : Sandiway, *Agrostis tenuis*, viii.1891 (R. Newstead). Surrey : Camberley, vi.1925 (E. E. Green). Berkshire : Silwood Park, *Holcus mollis*, *Festuca* sp. 8.viii.1949 (K. L. Boratynski).

NIPAECOCCUS Šulç

Nipaecoccus Šulç, 1945 : 1–48.
Nipaecoccus Šulç, Ferris, 1950 : 103.

Type of genus *Dactylopius nipae* Maskell.

The members of this genus are characterized by a peculiar blue-green or brown body content which shows up particularly during the preparation in caustic potash. There are always some dorsal setae of the same size or near the same size as cerarian setae and the antennae are usually 7-segmented.

Nipaecoccus nipae (Maskell)

Dactylopius nipae Maskell, 1893 : 230.
Pseudococcus nipae (Maskell), Fernald, 1903 : 107.
Pseudococcus nipae (Maskell), Green, 1917 : 262, 263.
Pseudococcus nipae (Maskell), Green, 1930 : 10.
Nipaecoccus nipae (Maskell), Šulç, 1945 : 1–48.
Nipaecoccus nipae (Maskell), Ferris, 1950 : 109.

A species recorded from palms in a few greenhouses in Britain. For a description and illustration see the work by Ferris.

ENGLAND. Surrey : Kew, Royal Botanic Gardens, *Cocos*, *Kentiopsis*, *Sabal*, xii.1916. London : Palm (J. C. F. Fryer). SCOTLAND. Midlothian : Edinburgh, Royal Botanic Gardens, *Calyptrogyne* sp. ix.1925 (E. E. Green).

PELIOCOCCUS Borchsenius

Peliococcus Borchsenius, 1948 : 954.

Type of genus *Phenacoccus chersonensis* Kiritchenko.

This genus is probably of world wide distribution although the bulk of the known species is from the Palaearctic Region. The distinguishing features of the genus are clusters of multilocular disc pores, each cluster with one or more slender tubular ducts near the centre ; claw with a denticle ; often with quinquelocular disc pores on the venter.

Peliococcus balteatus (Green)
(Text-fig. 11)

Phenacoccus balteatus Green, 1928 : 21.
Peliococcus balteatus (Green), Borchsenius, 1949 : 244.

HABIT. Described by Green as " Colour of living examples pale yellow with a fringe of very short tassels, with a pair of slightly longer tassels at the posterior extremity." From the under surface of the foliage of various grasses, more particularly on *Arrhenatherum elatius*, Cheddar Gorge, Somerset, ENGLAND, viii.1926. This is the only record for Britain.

RECOGNITION CHARACTERS. Adult female elongate oval attaining a length of 3·5 mm. in the available specimens ; anal lobes moderately developed. Antennae 9-segmented, 450–490 microns long. Legs normal, rather large, claw with a denticle, trochanter + femur 315–350 microns, tibia + tarsus 380–425 microns. Labium about 110 microns long. Circulus present, oval. Anterior and posterior ostioles with 2–4 setae and a few trilocular pores on each lip. Anal ring with 6 setae about twice length of its diameter. Cerarii numbering 18 pairs. Anal lobe cerarius usually with a group of 6 lanceolate setae and a few trilocular pores, the middle setae of the group surrounding a small sclerotized area. Anterior cerarii each with 2 smaller cerarian setae except those on head where there are up to 4 setae present ; each cerarius accompanied by a few trilocular pores. The cerarii often elevated slightly from the surrounding derm, especially those at the anterior and posterior ends of the body.

Dorsal surface of body with minute setae, sparse, some often with one or two trilocular pores near the base. Trilocular pores very few. On all segments except IX + X, there are pore clusters of 3–6 multilocular disc pores, the commonest number being 4. A single minute tubular duct present in the centre of each cluster. Clusters arranged in transverse rows at posterior edges of segments except on head where they become scattered.

Ventral surface of each anal lobe with a small area of sclerotization and an apical seta longer than anal ring setae. Ventral body setae around the margins, small and similar to those on dorsum ; in the median areas they are slender and much longer. Pore clusters arranged mainly on head, in transverse rows on segments III–V and around submargins of third and all posterior segments except IX + X. Multilocular disc pores, smaller than those in clusters, abundant at posterior edges of sixth and posterior segments. Quinquelocular disc pores few, present in median areas only between coxae and at anterior edges of segments II–VII. Tubular ducts with oral collar of one size, in transverse rows just anterior to the multilocular disc pores on segments VII and VIII and occasionally on margins of these segments. Trilocular pores sparse.

NOTES. This species seems to come close to *P. venustus* (Green) from Iceland and *P. saratogensis* (Rau) from U.S.A. These two species have clusters of multilocular disc pores consisting mainly of 3 pores, whereas in *P. balteatus* the clusters consist mainly of 4 pores. Furthermore *P. venustus* has 8-segmented antennae and those of the other two species are 9-segmented. Both *P. balteatus* and *P. saratogensis* have a similar distribution of multilocular disc pores in transverse rows on segments VI–VIII but *P. venustus* has an extra row on segment V.

PHENACOCCUS Cockerell

Phenacoccus Cockerell, 1893 : 318.
Phenacoccus Cockerell, Ferris, 1950 : 120.

Type of genus *Pseudococcus aceris* Signoret.

Some of the important characters of this genus are the 8–9-segmented antennae, a denticle on the claw, cerarii numbering from 9–18 pairs. Although not always

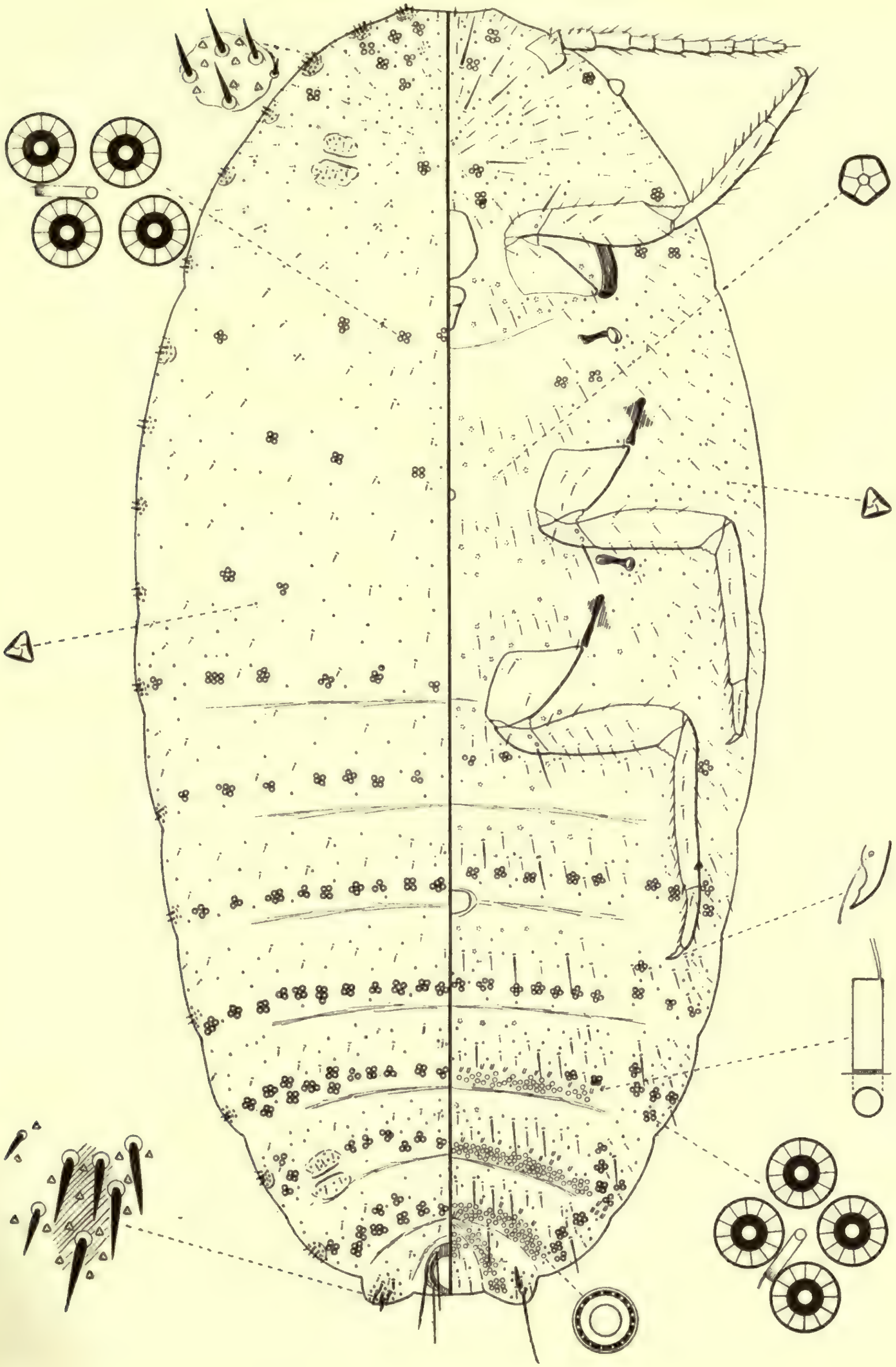

FIG. 11. *Peliococcus balteatus* (Green).

present, there are often quinquelocular disc pores on the venter and the dorsal setae are often minute and lanceolate. Borchsenius (1949) has resurrected the genus *Paroudablis* Cockerell because the type species *Boisduvalia piceae* Loew has larger tubular ducts on the dorsum than on the venter. No such distinction is made here although two British species possess these larger ducts. Only three species are known from Britain and these may be separated by the following key :

1 With 9–14 pairs of cerarii 2
– With 18 pairs of cerarii . . . . **aceris** (Signoret)
2 Cerarii numbering 9 pairs, circuli absent . . . . . . **interruptus** Green
– Cerarii numbering 14 pairs, circuli numbering 2–3, small and with rounded projections **sphagni** (Green)

Phenacoccus aceris (Signoret)

Pseudococcus aceris Signoret, 1875 : 329.
Pseudococcus ulicis Douglas, 1888 : 88.
Pseudococcus ulmi Douglas, 1888*a* : 124.
Pseudococcus aceris Signoret, Douglas, 1890 : 153.
Pseudococcus quercus Douglas, 1890 : 154.
Pseudococcus socius Newstead, 1892 : 144.
Phenacoccus aceris (Signoret), Fernald, 1903 : 90.
Phenacoccus aceris (Signoret), Green, 1915 : 180.
Phenacoccus aceris (Signoret), Green, 1921 : 151.
Phenacoccus aceris (Signoret), Green, 1923 : 215.
Phenacoccus aceris (Signoret), Green, 1926 : 182.
Phenacoccus aceris (Signoret), Green, 1928 : 30.
Phenacoccus aceris (Signoret), Ferris, 1950 : 126.

This is one of the most widely spread mealy-bugs in Britain. It is found on a variety of trees and is, apparently, very common on gorse. Ferris has given an excellent illustration and in his description he stated that there are 2 circuli present. This condition is probably the more common, but specimens at hand collected at Adel, Yorkshire, on gorse have only a single circulus. In other respects they are similar to the specimens with 2 circuli.

Borchsenius (1949) has accepted the name *Phenacoccus quercus* (Douglas) for specimens collected in Armenia on oak, stating that the species differs from *P. aceris* in possessing only a single circulus. Two specimens of Douglas' original material have been prepared and, although they are in poor condition, there is sufficient evidence of the presence of 2 circuli. It seems possible that the Armenian material represents a different species.

The specimens actually seen by the writer are listed below but there are many other records in the literature.

ENGLAND. Berkshire : Windsor, *Quercus* sp., 1930 (H. Donisthorpe) ; Silwood Park, *Quercus* sp., 26.v.1948, *Carpinus betulus*, 26.iv.1949, *Fagus* sp., 3.v.1955 (K. L. Boratynski). Buckinghamshire : Latimer, *Ulmus* sp., 29.v.1929 (F. Laing). Cheshire : Chester, *Sorbus aucuparia*, *Laburnum* sp., *Quercus* sp. (R. Newstead). Dorsetshire : Lyme Regis, *Ulex europaeus*, iv.1920. Essex : Epping Forest, *Quercus* sp., 25.v.1923 (C. L. Wittycombe). Hampshire : Bournemouth, *Ulex europaeus*, 16.iv.1902 ; Beaulieu, *Myrica gale*, vi.1919. Kent : Bearsted, *Ulex europaeus*, 1.vi.1896. London: Lewisham (*ulmi* Type). Norfolk: Ingoldisthorpe, *Ulex europaeus*, viii.1891 (R. Newstead). Northumberland: Riding Mill, Sycamore, vii.1950 (D. J. Williams). Surrey: Camberley, *Ulex minor*, 3.xi.1929 (E. E. Green); Oxshott, *Castanea sativa*, *Fagus sylvatica*, 22.iv.1921 (K. G. Blair); Kew, Apple, 3.v.1955 (K. L. Boratynski); Peach Hill, *Ulex europaeus*, 12.vii.1956 (K. L. Boratynski). Warwickshire: Farnborough, *Buxus sempervirens*, 25.vii.1922 (R. Newstead). Wiltshire: Wootton Bassett, peach, 21.iv.1938. Yorkshire: Wakefield, currant (R. Newstead) (*socius* Type); Adel, *Ulex europaeus*, 24.vi.1956 (D. J. Williams). SCOTLAND. Kincardineshire: Strachan, *Ulex europaeus*, 30.iv.1927 (G. D. Morison).

Phenacoccus interruptus Green

(Text-fig. 12)

Phenacoccus interruptus Green, 1923 : 215.
Phenacoccus interruptus Green, Green, 1925*a* : 43.
Phenacoccus interruptus Green, Green, 1928 : 30.

HABIT AND DISTRIBUTION. Described originally as " Colour pale purplish, masked by a rather close covering of white powdery secretion." Found on grasses from the following localities in ENGLAND. Surrey: Camberley, 28.viii.1922 (Type), 15.viii. 1923, 3.ix.1934 (E. E. Green). Somersetshire: Cheddar (E. E. Green).

RECOGNITION CHARACTERS. Body elongate elliptical, sides subparallel, length about 3·5 mm. anal lobes well developed. Antennae 9-segmented, 380–405 microns long. Legs well developed, normal; claw with a distinct denticle, trochanter + femur 240–275 microns, tibia + tarsus 320–340 microns. Labium 90–120 microns long. Circulus absent. Ostioles present; posterior pair with about 6 trilocular pores on each lip and apparently without setae; anterior pair with about 6 trilocular pores and 4 setae on each lip. Anal ring with 2 rows of pores and 6 setae over twice length of diameter of ring. Cerarii confined to anterior and posterior ends of body only, there being 9 definite pairs present. Anal lobe cerarii, each with a pair of well-developed lanceolate setae and a loose group of trilocular pores accompanied by about 2 minute auxiliary setae and all borne on a sclerotized plate slightly less in area than anal ring. Cerarii on segments VIII and VII on smaller sclerotized plates, each cerarius with a pair of short lanceolate setae and about 4 trilocular pores. On segments VI and V, cerarii each with a pair of setae and 3–4 trilocular pores but not on sclerotized plates. First 3 cerarii on head each with about 3 setae and fourth with 2 setae, all on sclerotized plates which become progressively smaller posteriorly. Sometimes single setae, a little stouter than dorsal body setae, present in positions of some of thoracic cerarii.

Dorsal surface with numerous minute lanceolate setae. Trilocular pores evenly distributed. Tubular ducts present of one size only, these rather large and without an oral collar, scattered on head and thorax but forming transverse rows on abdominal segments.

Ventral surface with a small elongate area of sclerotization on each anal lobe and an apical seta longer than anal ring setae. Ventral setae mainly slender and much longer than those on dorsum but small lanceolate setae present around margins. Multilocular disc pores on fifth and posterior segments only. Segment V with about 4 pores only, VI with 24–34, VII with 53–62, VIII with 66–84, IX + X with 36–48. Quinquelocular disc pores in median areas only. Trilocular pores on abdominal segments and around margins of thorax and head. Tubular ducts narrower than dorsal ducts, without an oral collar, present in transverse rows on all abdominal segments and a few in median and marginal areas of thorax.

NOTES. In his original description, Green described this insect as possessing " A single rather obscure, circular medio-ventral osteole." Furthermore he shows this

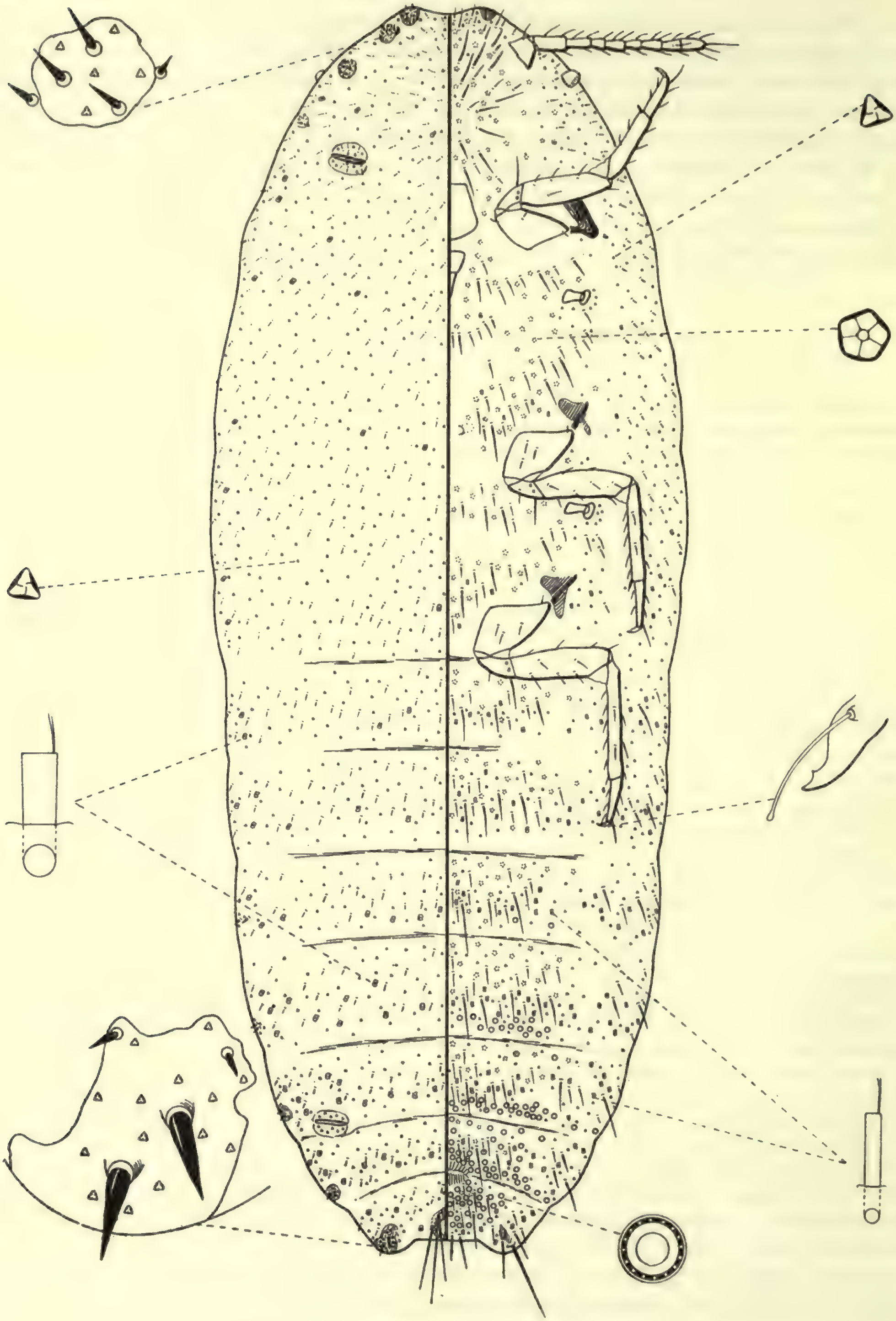

FIG. 12. *Phenacoccus interruptus* Green.

in a figure. The holotype specimen shows a round hole in the position of the circulus but it is evident that it is merely damage, probably caused by a needle as there are similar holes near it. Other specimens examined show no sign of a circulus and the species must be considered as not possessing one. Borchsenius (1949) has recorded this species from Russia as *Paroudablis interruptus* and possessing a large circulus but this is probably a different species. A single distorted specimen is at hand from Dorsetshire collected on sedge which shows a rather large circulus and this is possibly the same as the Russian species. It has not been possible to describe this species and the matter is left in abeyance until more satisfactory material is collected.

Phenacoccus sphagni (Green)

(Text-fig. 13)

Pseudococcus sphagni Green, 1915 : 178, 179.
Pseudococcus sphagni Green, Green, 1920 : 119, 120.
Phenacoccus sphagni (Green), Reyne, 1958 : 20.

HABIT AND DISTRIBUTION. Colour of adult female pinkish or dull red-brown, lightly dusted with wax and with wax projections at anterior and posterior ends of body. Described originally in nests of *Formica picea* amongst sphagnum moss in swampy ground. ENGLAND. Hampshire : New Forest, Matley Bog (H. K. Donisthorpe) and again in the New Forest, July, 1918. This is the only record for Britain but Reyne has recently recorded it from Holland.

RECOGNITION CHARACTERS. Body elongate oval about 4 mm. long, anal lobes well developed. Antennae 8-segmented, total length 400–450 microns. Legs normal, claw with a distinct denticle. Trochanter + femur 300–310 microns, tibia + tarsus 335 microns. Labium 75–90 microns long. Anterior and posterior ostioles present, lips each with 2–3 setae and 6–8 trilocular pores. Anal ring with 2 rows of pores and 6 setae about twice length of diameter of ring. Cerarii numbering 14 distinct pairs, those missing being on the meso- and metathorax and second abdominal segment. Each cerarius with 2 lanceolate setae and a group of trilocular pores. Circuli 2–3 in number lying on the third, fourth and occasionally fifth abdominal segments. Circulus on segment III very small with a rounded projection ; circulus on segment IV slightly larger with projection flattened apically ; circulus on segment V, when present, minute.

Dorsal surface with minute setae. Trilocular pores evenly distributed. Tubular ducts of one size only, each with oral collar barely perceptible, arranged in a wide band across the meso- and metathorax and each abdominal segment.

Ventral surface with a stout pair of apical setae longer than anal ring setae and long single marginal setae on abdominal segments which become progressively shorter anteriorly. Body setae slender but much longer than on dorsum except for a few minute lanceolate setae around margins. Multilocular disc pores on sixth and posterior segments only ; numerous on segments IX + X and at anterior and posterior edges of VII and VIII ; a transverse row on posterior edge of segment VI. Tubular ducts of two sizes. A larger type, similar to those on dorsum, arranged singly or in pairs on margins of segments VI–VIII. A smaller type in marginal groups on segment IV and posterior segments, becoming fewer anteriorly. Small numbers also around margins of anterior abdominal segments and thorax and in median areas of thorax. Quinquelocular disc pores very few between anterior coxae, clypeus and labium and an occasional pore on mesothorax. Trilocular pores evenly distributed.

NOTES. The distinguishing features of this species are the 8-segmented antennae, the reduced number of cerarii and the small peculiar circuli which are variously knobbed.

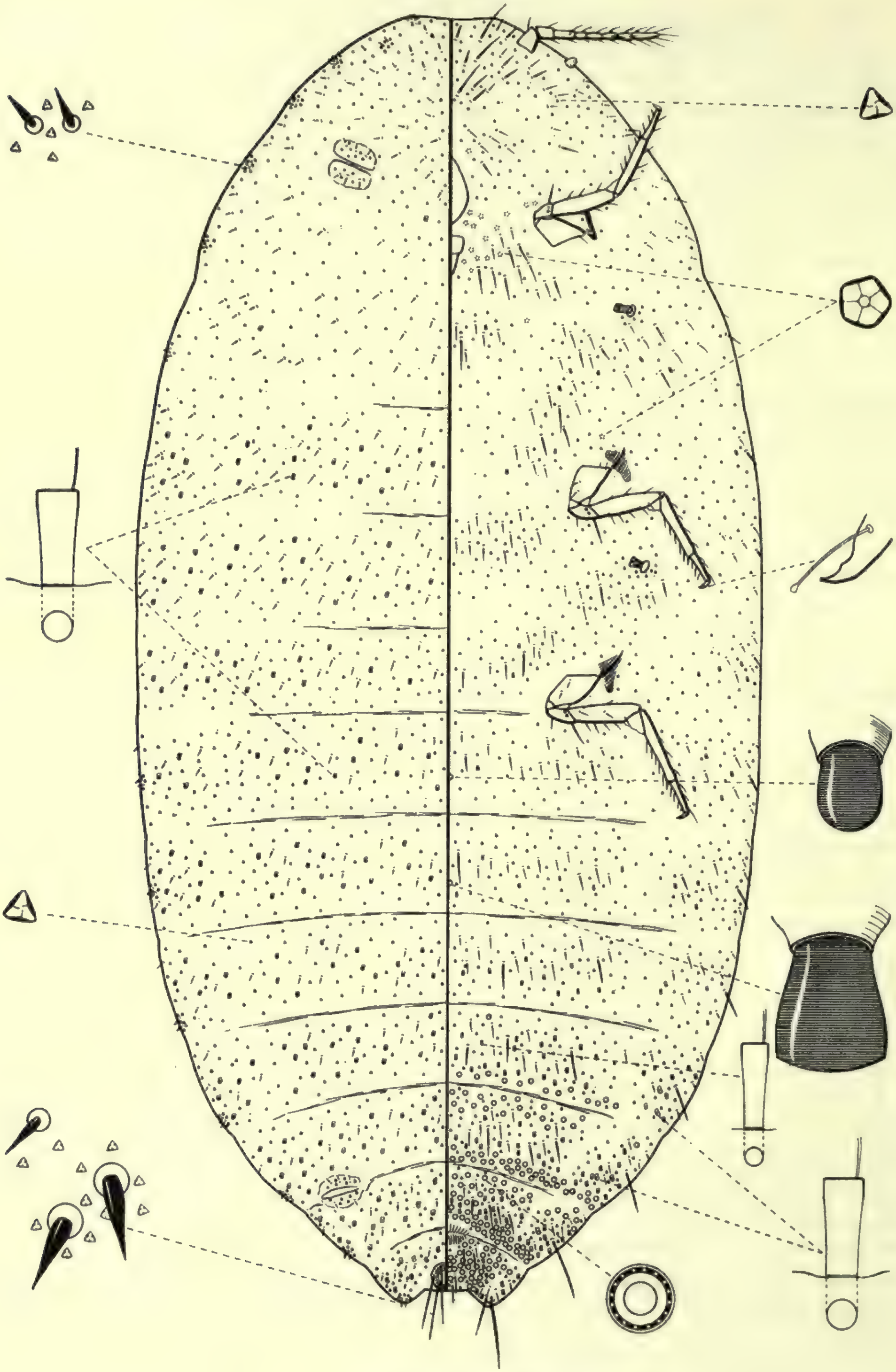

FIG. 13. *Phenacoccus sphagni* (Green).

PLANOCOCCUS Ferris

Planococcus Ferris, 1950 : 164.
Planococcus Ferris, Ezzat & McConnell, 1956 : 60.

A genus erected by Ferris for a number of species, the essential characters being the presence of an anal bar on the ventral surface of each anal lobe, 18 pairs of cerarii, these without auxiliary setae, tubular ducts with oral rim entirely lacking.

Planococcus citri (Risso)

Dorthesia citri Risso, 1813 : 416–418.
Pseudococcus citri (Risso), Fernald, 1903 : 99.
Planococcus citri (Risso), Ferris, 1950 : 165.
Planococcus citri (Risso), Ezzat & McConnell, 1956 : 65.

Newstead (1903) described an insect under the name *Dactylopius citri* but the specimens are undoubtedly *Pseudococcus latipes* Green. The only specimens seen from Britain are from greenhouses in ENGLAND from various localities and hosts. Excellent illustrations are available in the works by Ferris and Ezzat & McConnell.

PSEUDOCOCCUS Westwood

Pseudococcus Westwood, 1840 : 118.
Pseudococcus Westwood, Ferris, 1950 : 170.

Type of genus *Coccus adonidum* Linnaeus.

The limits of this genus were defined by Ferris and the essential features are the presence of oral rim ducts, at least on dorsum, and 16 or 17 pairs of cerarii with auxiliary setae.

There are no native British species and, although *P. fragilis* Brain occurs in the open in the southern counties, it has been introduced. The others are all greenhouse species. After remounting most of the specimens at hand, it is evident that all those identified and recorded as *P. comstocki* (Kuwana) from imported bananas should be referred to *Dysmicoccus alazon* recently described by Williams (1960). Specimens identified as *P. maritimus* (Ehrhorn) should be referred to *P. latipes* Green (=*P. malacearum* Ferris). Evidence in recent years suggests that *P. latipes* is a widespread species and may have been confused with *P. maritimus* and *P. comstocki*. A key to the British species is given below.

1 With not more than a single oral rim duct dorsally near each of most of cerarii. Multilocular disc pores in transverse rows on most abdominal segments 2
– With 2–3 oral rim ducts of different sizes dorsally near each of most of cerarii. Multilocular disc pores about vulva only . . . . **adonidum** (Linnaeus)
2 With a large oral rim duct dorsally, posterior to each frontal cerarius. Anal lobe cerarii placed near inner edge of an area of sclerotization . . . . **latipes** Green
– Without large oral rim duct dorsally posterior to each frontal cerarius. Anal lobe cerarii placed near the centre of surrounding sclerotized area . . . **fragilis** Brain

Pseudococcus adonidum (Linnaeus)

Coccus adonidum Linnaeus, 1766 : 740.
Dactylopius longispinus Targioni, 1867 : 1–87.
Dactylopius longispinus Targioni, Newstead, 1903 : 168.
Pseudococcus longispinus (Targioni), Fernald, 1903 : 104.
Pseudococcus adonidum (Linnaeus), Ferris, 1950 : 174.

In Britain, a greenhouse species only and, apparently, not so common as hitherto supposed. ENGLAND. Cambridgeshire : Cambridge, fern, 17.x.1935 (H. C. James). Berkshire : Reading, *Phormium tenax*, 24.viii.1948 (M. I. Crichton). Surrey : Kew, Royal Botanic Gardens, *Stangeria* sp., 7.v.1896. SCOTLAND. Midlothian : Edinburgh, Royal Botanic Gardens, *Cycas* sp. (R. S. MacDougall).

Pseudococcus fragilis Brain

Pseudococcus fragilis Brain, 1912 : 186.
Pseudococcus gahani Green, 1915 : 180.
Pseudococcus gahani Green, Green, 1920 : 120.
Pseudococcus gahani Green, Green, 1921 : 151.
Pseudococcus gahani Green, Green, 1931 : 100.
Pseudococcus fragilis Brain, Essig, 1942 : 351.
Pseudococcus gahani Green, Ferris, 1950 : 180.
Pseudococcus fragilis Brain, De Lotto, 1958 : 96.

Numerous specimens have been examined from various localities in ENGLAND, SCOTLAND, WALES and CHANNEL ISLANDS, some from greenhouses and others living in the open, especially in the southern counties. There is an excellent description and illustration under the name *P. gahani* in the work by Ferris.

Pseudococcus latipes Green

Dactylopius citri (Risso), Newstead, 1903 : 164. (Misidentification.)
Pseudococcus longispinus var. *latipes* Green, 1917 : 264.
Pseudococcus maritimus (Ehrhorn), Green, 1920 : 121. (Misidentification.)
Pseudococcus maritimus (Ehrhorn), Green, 1921 : 151. (Misidentification.)
Pseudococcus maritimus (Ehrhorn), Green, 1928 : 31. (Misidentification.)
Pseudococcus maritimus (Ehrhorn), Green, 1931 : 99. (Misidentification.)
Pseudococcus malacearum Ferris, 1950 : 185 (**syn. n.**).

This species is probably the commonest of the greenhouse mealy-bugs in Britain. It was first described as a variety of *P. longispinus* and later Green regarded it as being identical with *P. maritimus* but it is quite distinct from both. A detailed description has been given by Ferris under the name *P. malacearum* and there seems to be little doubt that it is the same as *P. latipes*. The most striking feature is the anal lobe cerarius with two conical setae surrounded by a crowded mass of pores. This cerarius is situated at the inner edge of an oval sclerotized area which extends posteriorly to the base of the apical seta. Very often there is a small prolongation at the anterior edge of the sclerotized area.

Specimens are at hand on a wide variety of hosts from many greenhouses in ENGLAND, WALES, SCOTLAND and CHANNEL ISLANDS.

RHIZOECUS Künckel d'Herculais

Rhizoecus Künckel d'Herculais, 1878 : 163.
Rhizoecus Künckel d'Herculais, Hambleton, 1946 : 50.
Rhizoecus Künckel d'Herculais, Ferris, 1953 : 426.

Type of genus *Rhizoecus falcifer* Künckel d'Herculais.

All the hypogeic mealy-bugs in *Rhizoecus* and related genera have been studied in great detail by Hambleton. Differences in number of antennal segments, the lengths of the claw digitules and the presence or absence of eyes have led Hambleton to place some of the following species in the genera *Ripersiella* Tinsley and *Morrisonella* (=*Coccidella* Hambleton). In the present work all species are left in the genus *Rhizoecus* following the definition by Ferris (1953). Six species are known from Britain and may be identified from the key.

1	Circulus absent	2
–	Circulus present	3
2 (1)	Antennae 5-segmented, abdominal tergites each with 10–16 tritubular pores	***falcifer*** Künckel d'Herculais
–	Antennae 6-segmented, abdominal tergites each with 2 or 3 tritubular pores at most	***dianthi*** Green
3 (1)	Multilocular disc pores present on venter, bitubular pores present	***halophilus*** (Hardy)
–	Multilocular disc pores absent on venter, tritubular pores present	4
4 (3)	With some tritubular pores on median and submedian areas of dorsum, labium 60–85 microns long	5
–	With a total of no more than 4 tritubular pores on dorsal margins only, labium 90–105 microns long	***elongatus*** Green
5 (4)	Labium 60–70 microns long	***albidus*** Goux
–	Labium 80–85 microns long	***cacticans*** (Hambleton)

Rhizoecus albidus Goux

(Text-fig. 14)

Ripersia halophila (Hardy), Green, 1917 : 262. (Misidentification.)
Rhizoecus (*Pararhizoecus*) *albidus* Goux, 1942 : 40.

Habit and distribution. In life these insects are white and so small as to resemble Collembola, for which they may be mistaken. They feed in the soil on the fine rootlets of grasses and often do extensive damage.

The species was first described from the roots of *Festuca* sp., at Bessenay, France. Material is at hand from the following localities in Britain : England. Hertfordshire : Rothamsted, 1936. Shropshire : Newport, 24.ii.1939 (H. C. F. Newton). Staffordshire : 1947 (H. C. F. Newton) ; Newcastle, ix.1960. Surrey : Camberley (E. E. Green) ; Egham, xii.1959 (K. L. Boratynski). Herefordshire : Hereford, i.1932 (H. E. Durham).

Recognition characters. A small elongate-oval species measuring approximately 1·5 mm. long. Posterior end of body rounded. Anal lobes poorly developed, each with 1 long ventral seta and 2 long dorsal setae, appearing as a group of 3. Eyes small. Antennae 6-segmented, geniculate, length 165–170 microns. Legs well developed, trochanter + femur 120–130 microns, tibia + tarsus 130–135 microns ; claw long and slender with claw digitules as long as or slightly longer than claw, with a very minute apical knob. Labium 60–70 microns long. Ostioles well developed, lower lip of each posterior pair without setae or trilocular pores ; other lips each

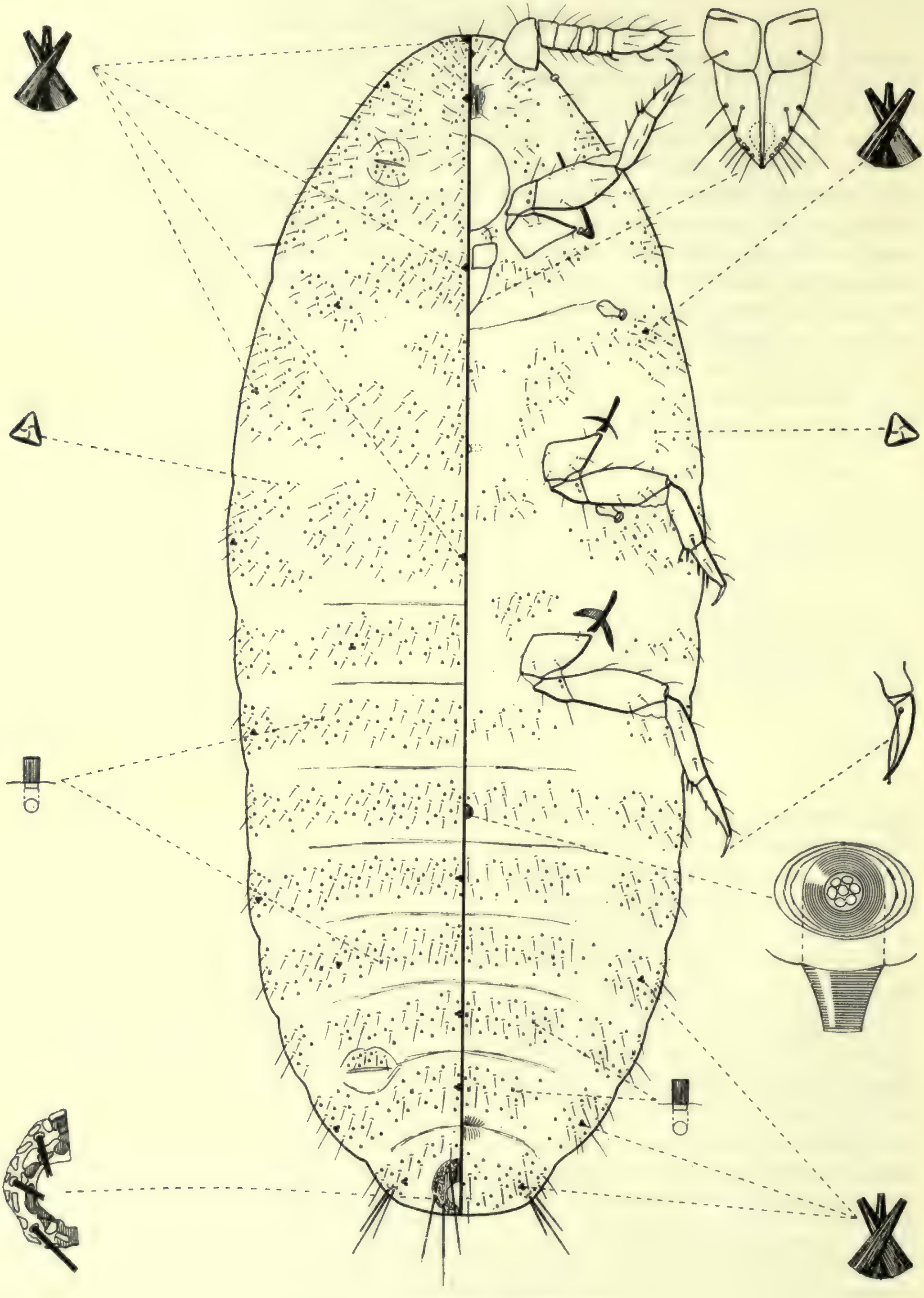

FIG. 14. *Rhizoecus albidus* Goux.

with 2–4 setae and 4–7 trilocular pores. Circulus present within borders of segment IV, heavily sclerotized and cone shaped with distal circular plate containing about 7 circular areas. Anal ring rather large in comparison to size of body ; anal ring setae about twice length of ring at its greatest diameter and about same length as apical setae.

Dorsal surface with numerous short pointed setae and forming distinct groups on thorax and head. Trilocular pores following the general distribution of the setae. Tritubular pores not numerous, there being rarely more than 3 on any segment of the abdomen or thorax and sometimes only a single one on mid-line ; tending to be scattered on head. Some very minute tubular ducts present on abdominal segments, these very simple and heavily sclerotized ; some segments entirely without ducts and others with at most 6.

Ventral surface with a more or less quadrate sclerotized area containing 4 marginal setae just anterior to clypeus. Body setae short and slender. Multilocular disc pores absent. Trilocular pores sparse. The setae and trilocular pores forming groups on thorax and head. Tritubular pores very few, there being a single marginal pore on some of posterior abdominal segments, occasionally one on thorax and one between antennal bases. Small tubular ducts, similar to those on dorsum, arranged 2–6 across some of posterior abdominal segments.

NOTES. Goux placed this species in the subgenus *Pararhizoecus* because it possesses a circulus similar to that of the type species *R.* (*Pararhizoecus*) *petiti* Goux. It is left in *Rhizoecus* following the definition of this genus by Ferris. Dr. Harold Morrison has kindly examined specimens of this species and has given valuable comments on its differences with *R. cacticans* and *R. elongatus*.

Rhizoecus cacticans (Hambleton)

Rhizoecus elongatus Green, Green, 1926 : 174 (in part as a misidentification).
Ripersiella cacticans Hambleton, 1946 : 64.
Rhizoecus cacticans (Hambleton), Ferris, 1953 : 432.

Specimens examined, all from greenhouses, include the following : ENGLAND. Hampshire : Bournemouth, *Phyllocactus* sp. (as a misidentification of *R. elongatus*). Isle of Wight : Sandown, roots of cactus, ii.1949 (E. Elkan). Essex : Laindon, *Mammillaria* sp., roots, xii.1928 (G. Fox-Wilson).

This species belongs to a group similar to *R. albidus* and *R. elongatus*. All are devoid of multilocular disc pores and possess small sclerotized tubular ducts. It comes closest to *R. albidus* but differs mainly in the length and shape of the labium (see key). Ferris has redescribed and illustrated this species.

Rhizoecus dianthi Green
(Text-fig. 15)

Rhizoecus dianthi Green, 1926 : 175.
Morrisonella dianthi (Green), Hambleton, 1946 : 23.
Coccidella dianthi (Green), Hambleton, 1946*a* : 177.

HABIT AND DISTRIBUTION. Appearance in life not known. This species is known only from the roots of various plants in greenhouses. It was described from *Dianthus plumarius* and *D. barbatus*, ENGLAND, Surrey, Wisley, Royal Horticultural Society's Gardens, and from other plants in the London area. Collected since from Wisley on other occasions on various plants. Specimens have also been seen from Hampshire: Salisbury, *Pelargonium* sp. roots, viii.1926 (G. Fox-Wilson). Somersetshire : Taunton, *Adiantum* sp., 7.iii.1904.

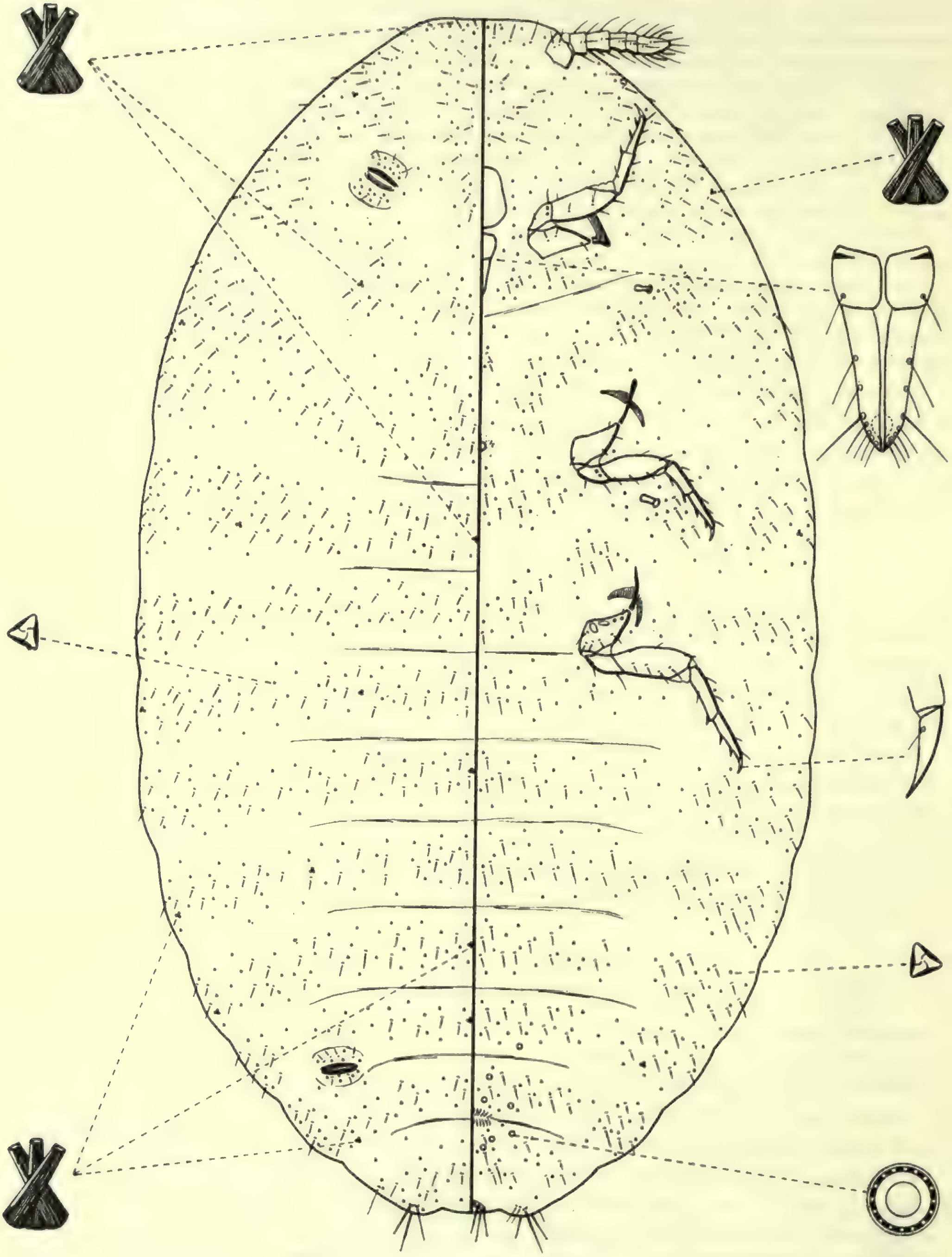

FIG. 15. *Rhizoecus dianthi* Green.

RECOGNITION CHARACTERS. Body broadly oval, length about 2 mm. Anal lobes poorly developed, each with a long ventral apical seta and 2 slightly shorter dorsal setae. Antennae 6-segmented about 170–175 microns long. Eyes present, very small. Legs normal for the genus, slender; posterior coxae with a few large oval areas; trochanter + femur 145–155 microns, tibia + tarsus 145–155 microns. Labium 85–95 microns long. Claw slender with very short pointed digitules. Ostioles with inner edges of lips sclerotized and with 2–4 setae and 5–8 trilocular pores on each lip. Circulus absent. Anal ring inclined to ventral surface when mounted on the slide.

Dorsal surface with numerous short slender setae. Trilocular pores evenly distributed. Tritubular pores sparse, there being from 2–4 on some abdominal segments and absent entirely on other segments; occasional pores present on thorax and head.

Ventral surface with short setae similar to those on dorsum. Multilocular disc pores few on posterior abdominal segments only. Segment VII with 1 or 2, VIII with 4–7, IX + X with 3–6, there being scarcely more than 12 altogether. Tubular ducts absent. Trilocular pores distributed fairly evenly. Tritubular pores not constant in position although there is often a single marginal pore present on one of posterior abdominal segments and a single pore on margins of pro- and metathorax.

NOTES. This species comes very close to *R. cyperalis* (Hambleton) described from El Salvador and both may be identical.

Rhizoecus elongatus Green

(Text-fig. 16)

Rhizoecus elongatus Green, 1925*a* : 174.
Rhizoecus mesembryanthemi Green, 1931 : 103 (**syn. n.**).
Morrisonella elongata (Green), Hambleton, 1946 : 25.
Morrisonella mesembryanthemi (Green), Hambleton, 1946 : 33.
Coccidella elongata (Green), Hambleton, 1946*a* : 177.
Coccidella mesembryanthemi (Green), Hambleton, 1946*a* : 177.

HABIT AND DISTRIBUTION. Appearance in life not known. A greenhouse species described from the roots of *Phyllocactus* sp., ENGLAND, Hampshire, Bournemouth. Recorded also from the roots of *Mesembryanthemum* sp., Surrey: Oxted (Type of *R. mesembryanthemi*). These are the only records from Britain but specimens are also at hand, collected by Dr. A. Reyne from Holland, Zeist Utrecht, on *Aloe variegata* roots.

RECOGNITION CHARACTERS. A small elongate species with parallel sides attaining a length of 2 mm., posterior end rounded, anal lobes with 1 long ventral seta and 2 slightly shorter dorsal setae. Antennae 6-segmented, about 240 microns long. Legs normal for the genus, claw slender and elongate with claw digitules either same length or slightly longer than claw, with minute apical knob; trochanter + femur 165–175 microns, tibia + tarsus 190 microns. Labium elongate, about 90–105 microns long. Eyes present, very small. Dorsal ostioles fairly well developed; lower lip of each posterior pair with about 4 trilocular pores and without setae; all other lips with 2–4 setae and about 4 trilocular pores. Cerarii absent. Circulus within borders of fourth abdominal segment, heavily sclerotized in the form of a truncated cone, wider than deep, the distal circular plate with numerous subcircular areas. Anal ring rather large for size of body, with 6 setae about twice length of diameter of ring and same length as apical setae.

Dorsal surface of body with numerous short slender setae and trilocular pores, both evenly distributed on abdomen and metathorax but anteriorly forming large groups so that there are some areas entirely clear. Minute tubular ducts present on thorax and abdomen; each in the form of a simple sclerotized internal tube; majority of segments with, at most, about 6–8

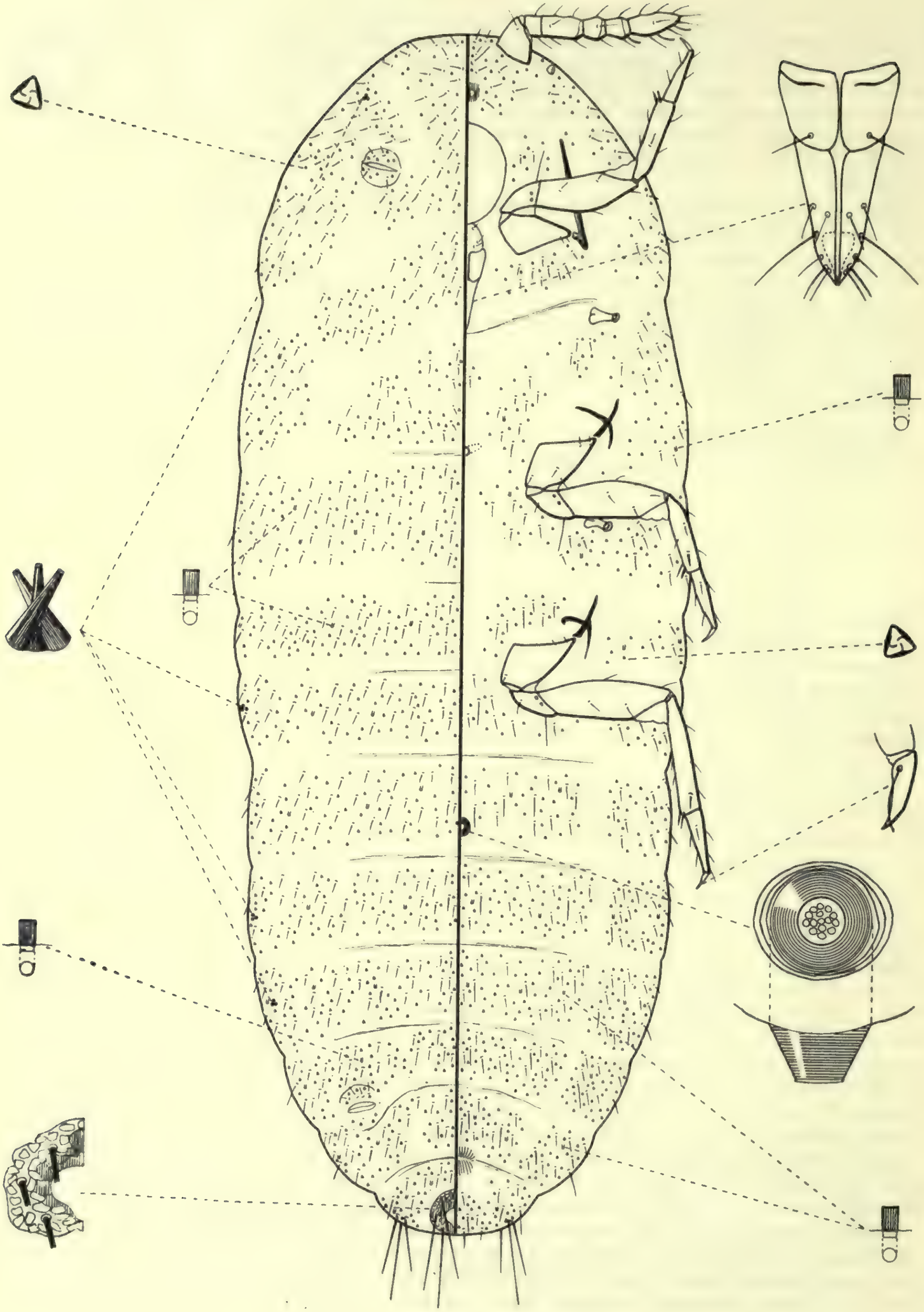

FIG. 16. *Rhizoecus elongatus* Green.

in a transverse row. Tritubular pores sometimes absent entirely or more often with 1 or 2 on margins of each side of body or on one side only, there being usually one on head and others on some abdominal segments.

Ventral surface with a small sclerotized plate anterior to clypeus. Short slender setae and trilocular pores numerous on abdomen but anteriorly they become sparse and form definite groups. Multilocular disc pores and tritubular pores absent. Minute tubular ducts, similar to those on dorsum, very sparse, there being 2–8 in transverse rows on abdominal segments and occasional ducts on thorax.

NOTES. This is a distinctive species with reduced numbers of tritubular pores. In his original description, Green stated that these pores were absent but in the specimens available this condition is very rare as there are usually one or two present on dorsum. Green's statement of the two different sized limbs in the type slide was due to the presence also of specimens of *R. cacticans*. He also stated, in his description of *R. mesembryanthemi*, that the body was completely devoid of setae. The original material has numerous setae and the specimens are identical with *R. elongatus*.

Rhizoecus falcifer Künckel d'Herculais

Rhizoecus falcifer Künckel d'Herculais, 1878 : 164.
Ripersia terrestris Newstead, 1895*a* : 213.
Ripersia terrestris Newstead, Newstead, 1903 : 190.
Rhizoecus decoratus Green, 1926 : 177.
Rhizoecus decoratus Green, Green, 1928 : 31.
Rhizoecus decoratus Green, Green, 1930 : 10.
Rhizoecus decoratus Green, Green, 1931 : 102.
Rhizoecus terrestris Newstead, Green, 1931 : 102.
Rhizoecus decoratus Green, Green, 1934 : 111.
Rhizoecus falcifer Künckel d'Herculais, Hambleton, 1946 : 53.
Rhizoecus falcifer Künckel d'Herculais, Ferris, 1953 : 444.

This species is now known from many parts of the world. In Britain it is found only in greenhouses on roots of numerous plants and is, apparently, quite common. Formerly known in Britain under the names *Rhizoecus terrestris* and *R. decoratus*, it was shown by Hambleton that these were the same as *R. falcifer*. For an illustration, see the work by Ferris. British specimens examined include the following : ENGLAND. London : palm roots, 1895 (C. O. Waterhouse) (*terrestris* type). Yorkshire : Hull, Eastington, roots of *Abutilon* sp., iv.1925 (*decoratus* type). Lancashire : Fallowfield, *Carex* sp., roots, 19.viii.1926 (J. H. Watson). Surrey : Wisley, Royal Horticultural Society's Gardens, *Dracaena* sp. roots, 6.iii.1928 (G. Fox-Wilson), roots of various plants, 5.v.1953 (D. J. Williams) ; Kew, Royal Botanic Gardens, 2.ii.1932 (G. Fox-Wilson) ; Richmond, *Gardenia* roots, xii.1950. Warwickshire : Studley, lily roots, 27.v.1935 (J. F. Perkins). IRELAND. Dublin, *Adiantum* sp., roots, iii.1901.

Rhizoecus halophilus (Hardy)

(Text-fig. 17)

Coccus halophilus Hardy, 1868 : 136, 137.
Dactylopius radicum Newstead, 1895*b* : 235 (in part, misidentification).
Ripersia halophila (Hardy), Newstead, 1903 : 192.

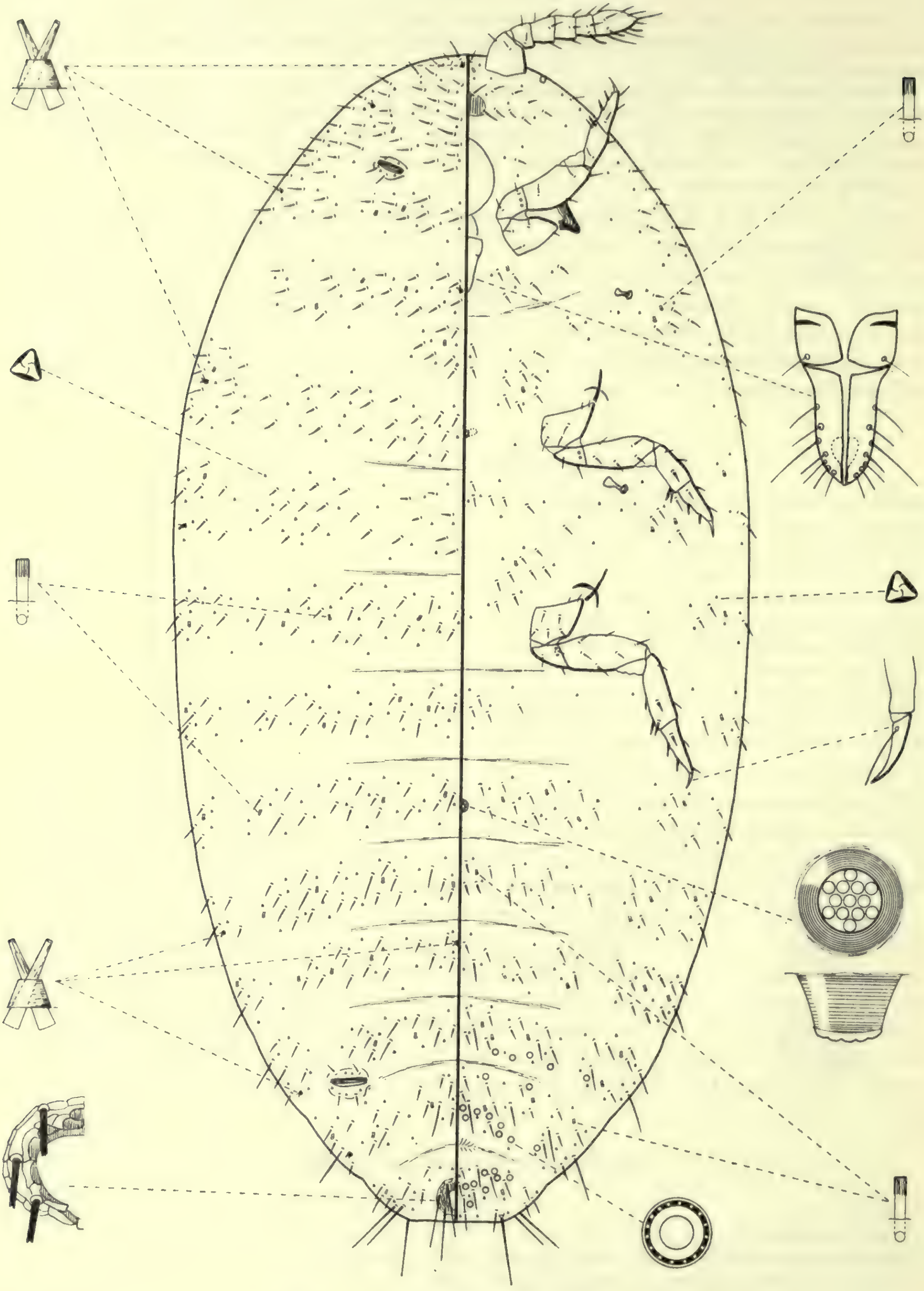

FIG. 17. *Rhizoecus halophilus* (Hardy).

Ripersia halophila (Hardy), Green, 1921 : 191.
Rhizoecus halophila (Hardy), Green, 1926 : 174.

HABIT AND DISTRIBUTION. The reference to this species has long since been forgotten and as it is in a journal which may not be readily available, the full original description is given below.

" 6. *Coccus halophilus*, J. H. The Cocci offer few tangible specific characters. The present species apart from its peculiar habitudes cannot be readily discriminated by words. It is scarcely a quarter of a line long, oval, opaque white, without a hard scale, abundantly supplied with a white secretion. Found on the steep sea-banks near Fastcastle [SCOTLAND : Berwickshire] among the roots of *Ligusticum Scoticum*, and *Rhodiola rosea* ; and afterwards on the roots of *Statice Armeria* in the greywacke cliffs near Siccar Point. In both cases it follows the long fibrils minutely interwoven through the loose slaty *débris*."

Newstead has described the insect as pure white and with two appendages at the caudal extremity. It feeds only on the roots and is, apparently, not associated with ants. The known distribution is as follows :

ENGLAND. Norfolk : Blakeney Point, roots of *Armeria maritima*, vii.1920 (E. E. Green). Isle of Man : Port Erin, roots of grass, 21.ix.1918 (R. Newstead). SCOTLAND. Fifeshire : Isle of May, roots of grasses, ix.1913 (W. Evans). Inverness-shire : (Outer Hebrides) St. Kilda, grass roots, vi.1902 (R. Newstead). Ross and Cromarty : Swordale, roots of *Calluna* sp., 21.i.1921 (D. J. Jackson). WALES. Anglesey : Puffin Island, on *Armeria maritima*. IRELAND. Donegal : among turf, viii.1942 (J. Lister).

RECOGNITION CHARACTERS. Adult female ovate, about 1·5 mm. long. Posterior end with poorly developed anal lobes, each with 1 long ventral apical seta and 2 smaller dorsal setae. Antennae 6-segmented, total length approximately 155–170 microns. Legs normal, trochanter + femur 115–130 microns, tibia + tarsus 130–145 microns, claw with slender digitules about same length or longer than claw with very small knob at apex. Labium about 75 microns long. Eyes present. minute. Ostioles well developed, inner edges of lips sclerotized and each lip with about 2 setae and 2 or 3 trilocular pores ; occasionally without setae. Circulus present within borders of fourth abdominal segment, sclerotized and small, in form of truncate cone, wider than deep, distal surface with minute circular areas. Anal ring with 6 setae twice length of its diameter and about same length as apical setae.

Dorsal surface with slender setae of various lengths but mostly small. Trilocular pores not numerous. Tubular ducts small and slender without oral collar, in transverse rows of up to 8 on abdominal segments and becoming scattered on thorax and head. Bitubular pores present, very sparse, there being a marginal series of about 8 on each side of body and 2 or 3 on midline.

Ventral surface with short slender setae but tending to be longer on posterior abdominal segments, not numerous. Trilocular pores sparse. Bitubular pores absent. Tubular ducts, similar to those on dorsum, very few, situated in transverse rows on abdominal segments and becoming scattered on thorax and head. Multilocular disc pores on seventh and posterior segments only, there being scarcely more than 50 altogether but some specimens with as few as 30.

NOTES. The identification of this species is based on those made by Newstead and Green. It comes very close to *Rhizoecus* (*Pararhizoecus*) *petiti* described by Goux (1941*a*) another species with bitubular pores but in this case the multilocular disc pores are much more numerous and are situated on the fifth and posterior segments whereas in *R. halophilus* they are present on the seventh and posterior segments.

SACCHARICOCCUS Ferris

Saccharicoccus Ferris, 1950 : 216.

Type of genus *Dactylopius sacchari* Cockerell.

RECOGNITION CHARACTERS. Pseudococcidae with 7-segmented antennae. Two pairs of dorsal ostioles present. Circulus longer than wide, situated across the segmental line between fourth and fifth abdominal segments, medially constricted. Legs without a denticle on the claw. Minute irregular pores present on the surrounding derm near the attachment of the posterior coxae. Tubular ducts either few on ventral side of abdomen or numerous on both surfaces. Multilocular disc pores on dorsum and venter. Cerarii 1 pair, on anal lobes only.

NOTES. This genus was erected for the single species *Dactylopius sacchari*, having many characters similar to those of *Trionymus*. The description given by Ferris has been modified to cater for the species described below as new. One of the striking features of the new species is the large number of small irregular-shaped pores near the attachment of the posterior coxae. This character is shared also by *S. sacchari* but has, apparently, been overlooked. An examination of many correctly stained specimens of *S. sacchari* from various localities, shows that these pores are always present. The long stout marginal setae on the abdomen of *S. sacchari* are probably only of specific value and have been excluded from the generic definition as given by Ferris.

Saccharicoccus penium **sp. n.**

(Text-fig. 18)

HABIT AND DISTRIBUTION. Description in life not known. Found at the base of grasses, ENGLAND, Hampshire, Yateley, 25.ix.1926 (E. E. Green).

RECOGNITION CHARACTERS. Adult female elongate, with more or less parallel sides, attaining a length of 3·5 mm. Anal lobes moderately developed. Antennae 7-segmented, small, about 240–250 microns long. Legs small and slender, trochanter + femur 150–170 microns, tibia + tarsus 165–175 microns. Labium about 70 microns long. Anterior and posterior ostioles poorly developed, each lip with 2–3 trilocular pores and lacking setae. Circulus large, longer than wide with sides constricted, hour-glass shaped. Cerarii represented by anal lobe pair only, each with 2 short conical setae set close together, surrounded by a group of about 7 or 8 trilocular pores and accompanied by a single auxiliary seta. Anal ring with 6 setae about twice as long as diameter of ring.

Dorsal surface with short pointed setae, not numerous. Trilocular pores with an even distribution. Multilocular disc pores forming definite transverse rows at posterior edges of segments V–VIII. Elsewhere on the body they tend to be scattered, although there is a noticeable concentration on the head margin and they are absent or nearly so in the median areas of the thorax. Tubular ducts of 2 types. A smaller type, slender, without any appreciable oral collar, in transverse rows in the middle of metathorax and abdominal segments. A larger type of duct, each with a large collar and a larger flange-shaped membranous ring arising from the inner edge of the collar, situated in transverse rows on segments VI–VIII and in a small group on anal lobes. Others present around head margins and an occasional one present elsewhere on the body.

Ventral surface with a pair of apical setae only slightly longer than anal ring setae. Body setae not numerous, all short and slender but tending to be longer than those on dorsum, especially in median areas. Minute simple pores of different shapes and sizes clustered near posterior coxae from which they extend laterally and posteriorly to segment III. Trilocular pores evenly distributed, sparse. Multilocular disc pores abundant in transverse rows at posterior edges of segments V–VIII. They are also numerous on segments IX + X, at anterior edges of segments

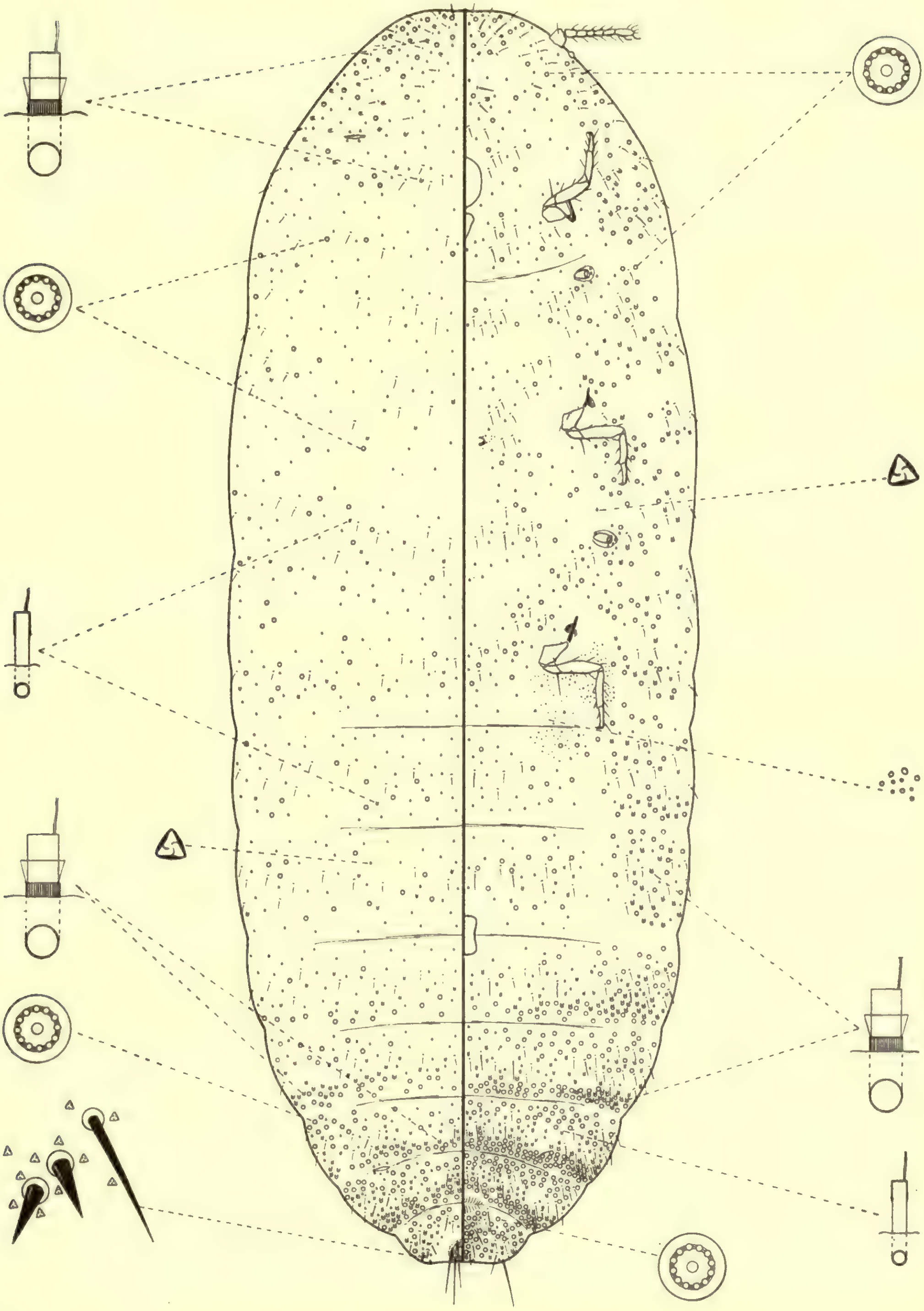

FIG. 18. *Saccharicoccus penium* sp. n.

VI–VIII and in a submarginal zone around body. Elsewhere they become scattered. Tubular ducts of same 2 sizes as on dorsum. A smaller type mainly in transverse groups in middle of segments V–VIII. A larger type numerous in marginal groups on abdominal segments, sometimes extending to median areas especially on posterior abdominal segments. Present also around the submargins of thorax and head in close association with the multilocular disc pores.

NOTES. This species differs from *S. sacchari* in possessing much more numerous multilocular disc pores and tubular ducts. The minute irregular pores tend to be concentrated lateral and posterior to the hind coxae whereas in *S. sacchari* they are mostly situated just anterior.

SPILOCOCCUS Ferris

Spilococcus Ferris, 1950 : 219.
Spilococcus Ferris, McKenzie, 1960 : 755.

Ferris erected this genus for species with oral rim ducts and with the cerarii lacking auxiliary setae. As stated in the discussion on *Atrococcus*, McKenzie has limited the genus to those species possessing from 6–17 pairs of cerarii and has erected the genus *Chorizococcus* for species with from 0–4 pairs of cerarii. Although *Atrococcus* is distinct in having species with a black body content and with the cerarii on abdomen only, the position is complicated with *Spilococcus cactearum* McKenzie, a species with an obvious relationship to other species of *Spilococcus* yet possessing a black body content. It is left in this genus for the time being pending further research.

Apart from *S. cactearum*, the other British species, *S. filicicola* (Newstead), is placed here as a temporary measure.

Spilococcus cactearum McKenzie

(Text-fig. 19)

Pseudococcus mamillariae Bouché, Green, 1930 : 9. (Misidentification.)
Spilococcus cactearum McKenzie, 1960 : 757.

HABIT AND DISTRIBUTION. According to McKenzie the adult female is covered with an even, light grey secretion. When boiled in caustic potash the body content turns black or blue-black. So far as is known, the species is confined to the Cactaceae. Specimens have been examined as follows : ENGLAND. Essex : Laindon, vi.1928 (T. M. Endean). Middlesex : Pinner, v.1947 (R. E. Elkan).

RECOGNITION CHARACTERS. Adult female broadly oval attaining a length of 2·5 mm. Anal lobes well developed. Antennae 8-segmented, 310–335 microns long. Legs normal, posterior coxae with a few translucent pores, posterior tibia with a small group of such pores ; claw with a denticle ; trochanter + femur 215–240 microns, tibia + tarsus 240–250 microns. Labium about 70 microns long. Anterior and posterior ostioles present, inner edges of lips sclerotized, each lip with 2 or 3 setae and about 6 trilocular pores. Circulus rather large, oval. Anal ring with a double band of pores and 6 setae about twice length of its diameter. Cerarii numbering 9–14 pairs, those on head and thorax variable in number but there are usually 7 pairs present on abdomen. Anal lobe cerarii each with a pair of slender conical setae set close together and accompanied by 5 or 6 trilocular pores and 3 or 4 auxiliary setae, the area at base of cerarian setae lightly sclerotized. Anterior cerarii each with setae more slender, sometimes wide apart but their presence can be detected by a group of 3 or 4 trilocular pores, without auxiliary setae.

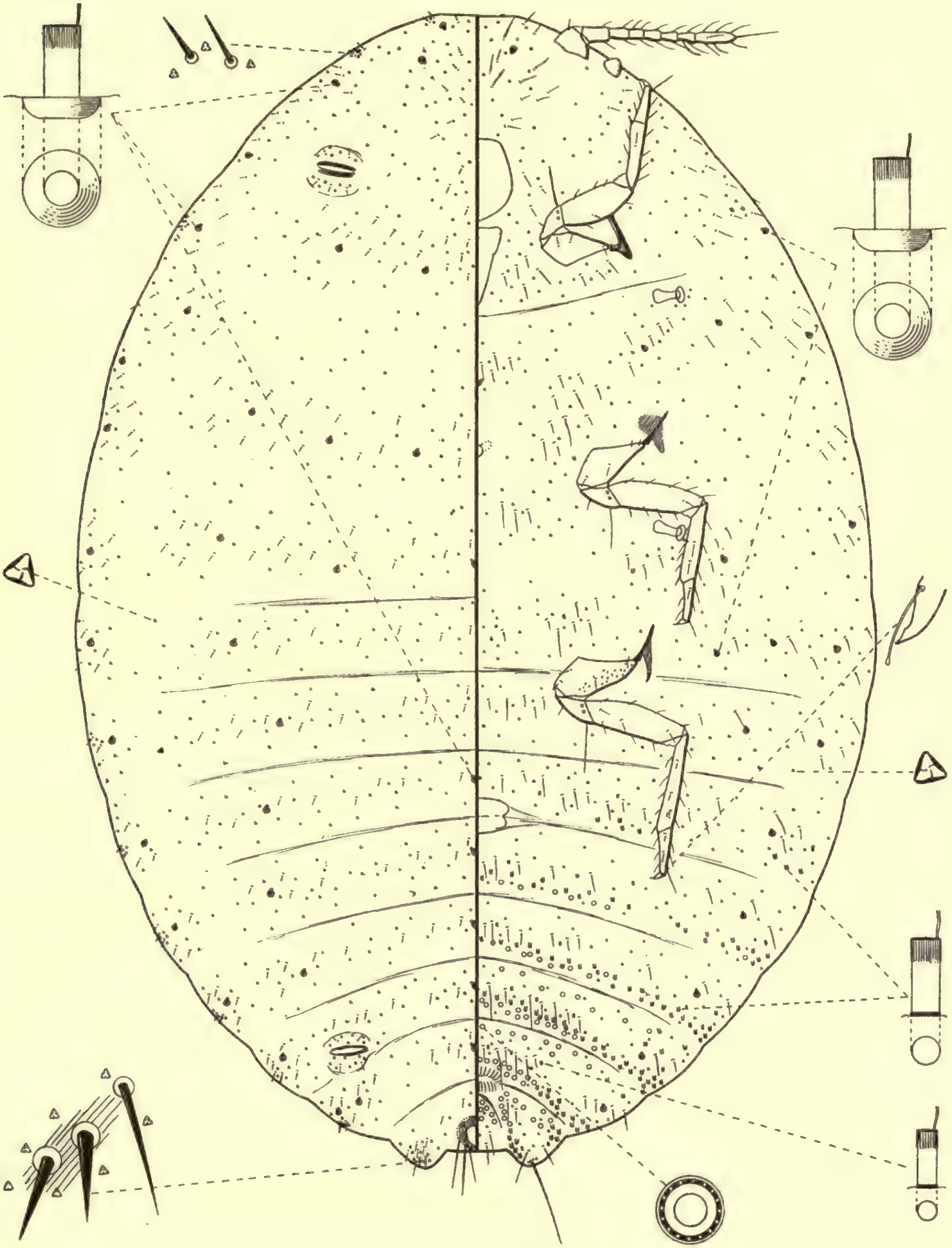

FIG. 19. *Spilococcus cactearum* McKenzie.

Dorsal surface of body with very small slender setae, not numerous. Trilocular pores evenly distributed. Tubular ducts with oral rim on segment VIII and all anterior segments, arranged in single transverse rows on abdomen, there being rarely more than 6 on each segment ; on the thorax and head they become scattered.

Ventral surface with a pair of long apical setae longer than anal ring setae. Other setae slender but usually longer than those on dorsum especially on median areas, not numerous. Multilocular disc pores on abdomen only, confined to segments posterior to circulus. Arranged in transverse rows at posterior edges of segments and at anterior edges of segments VII and VIII. Tubular ducts with oral collar of two sizes. A small type, very few in transverse rows in middle of some of posterior abdominal segments and on anal lobes, an occasional duct sometimes present on thorax. A larger type in transverse rows on fourth and posterior segments immediately anterior to multilocular disc pores and usually continuous with noticeable marginal groups. One or two also present on thorax. Tubular ducts with oral rim arranged singly or in pairs on margins of segments IV–VIII but forward to metathorax they are more numerous, often with 2 or 3 on each segment. There is usually a pair between antennal bases and often 1 in median area of thorax. Trilocular pores not numerous but with an even distribution.

NOTES. This species has often been misidentified as *Pseudococcus mamillariae* based on the description of *Coccus mamillariae* Bouché. It has been shown by McKenzie, on the basis of a report by Lindinger (1934), that it cannot be the species described by Bouché and consequently McKenzie has described this black cactus-infesting species as new. British specimens have been checked against material from France collected by A. Balachowsky and from Italy collected by G. Paoli.

Spilococcus filicicola (Newstead) (**comb. n.**)

(Text-fig. 20)

Ripersia filicicola Newstead, 1898 : 96.
Ripersia filicicola Newstead, Newstead, 1903 : 184.

HABIT AND DISTRIBUTION. Newstead stated that in life this insect was pale ochreous yellow or red-pink ; farinose, with broad irregular wax appendages on the margin of the abdominal segments. The insects also secrete slender iridescent filaments radiating from the sides of the body.

Known only from a greenhouse in the Royal Botanic Gardens, Kew, ENGLAND, on the fronds of *Trichomanes spicatum*, 27.ii.1897. It is possible that it will be found eventually in Central or South America.

RECOGNITION CHARACTERS. A broadly oval species, length of available specimens 1·5 mm., anal lobes well developed. Antennae 6-segmented, 240 microns long. Legs normal, stout, trochanter + femur 180 microns, tibia + tarsus 170 microns. Labium 105 microns long. Circulus absent. Ostioles well developed, inner edges of lips sclerotized, each lip with 0–2 setae and 4–6 trilocular pores. Anal ring with a double band of pores and 6 setae about twice length of ring at its greatest diameter. Cerarii numbering 10 pairs, there being 2 pairs on head and 8 pairs on abdomen. Anal lobe cerarii each with a pair of stout conical setae and a small group of about 7 or 8 trilocular pores accompanied by 6 auxiliary setae and a few other trilocular pores all on a large oval sclerotized plate the same area as anal ring. Anterior cerarii each with 3–7 trilocular pores and a pair of small conical setae except the frontal pair which have 3 conical setae, all without auxiliary setae.

Dorsal surface sparsely beset with short slender setae. Trilocular pores evenly distributed, not numerous. Tubular ducts present, of oral rim type, rather large. Each duct often with 1–3 trilocular pores and 1 or 2 setae immediately surrounding base of oral rim but not attached to it, although some ducts entirely without these. In the 2 specimens at hand there are 7 ducts

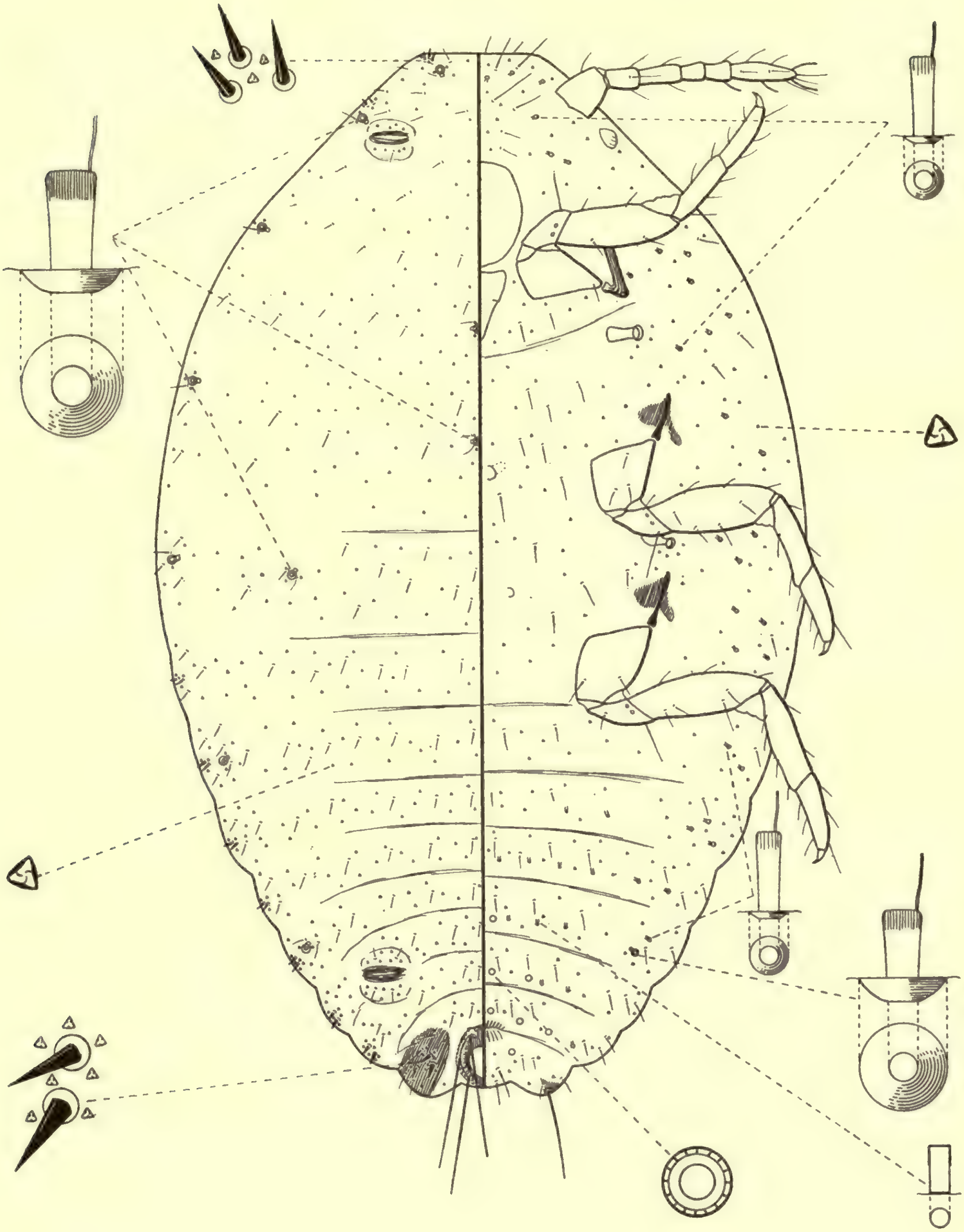

FIG. 20. *Spilococcus filicicola* (Newstead).

equispaced on either side of margin, 2 on mid-line of thorax and a pair in submedian areas of metathorax.

Ventral surface with small triangular sclerotized area on each anal lobe and an apical seta shorter than anal ring setae. Body setae few, short and slender but, for the most part, longer than dorsal setae. Trilocular pores evenly distributed but sparse. Multilocular disc pores in single transverse rows on median area of abdomen only. Tubular ducts with oral collar very few, in transverse rows on segments IV–VII. Tubular ducts with oral rim of 2 types. A single duct, slightly smaller than those on dorsum, but with rim of larger diameter than a multilocular disc pore, present on either side of segment VI. A smaller type of duct, each with a narrow rim of smaller diameter than a multilocular disc pore, present around the margins where they are more numerous on thorax.

NOTES. The placing of this species in *Spilococcus* is tentative as the dorsal sclerotization on the anal lobes and the very large oral rim ducts are not found on other species in the genus. Although some of the oral rim ducts have one or two setae and some trilocular pores around the base of the rim, this character is not constant.

SPINOCOCCUS Borchsenius

Spinococcus Kiritchenko, 1931 : 314 (*nom. nud.*).
Spinococcus Borchsenius, 1949 : 393.

Type of genus *Acanthococcus marrubii* Kiritchenko.

The main characters of this genus are the 17–18 pairs of cerárii with conical setae, these elevated slightly from the surrounding derm and with 2–10 trilocular pores immediately at the base. Dorsal setae similar in shape and size to cerarian setae, there being usually a row of dorsal cerarii on mid-line. Antennae 8–9-segmented. Claw with distinct denticle. Quinquelocular disc pores on ventral surface.

Spinococcus calluneti (Lindinger)

(Text-fig. 21)

Pseudococcus calluneti Lindinger, 1912 : 90.
Parapedronia calluneti (Lindinger), Balachowsky, 1954 [1953] : 230.
Spinococcus calluneti (Lindinger), Zahradník, 1959 : 537.
Spinococcus calluneti (Lindinger), Danzig, 1960 : 176.

HABIT AND DISTRIBUTION. Apparently confined to *Calluna* spp. and *Erica* spp. where it feeds mainly on the roots. Described originally from Germany and found on two occasions only in Britain as follows : ENGLAND. Cheshire : Chester, roots and flowers of *Erica cinerea*, *Calluna* sp., viii.1922 (R. Newstead). Surrey : Oxshott, *Calluna vulgaris* roots, x.1925 (K. Mansour).

RECOGNITION CHARACTERS. Adult female ovate about 1·5 mm. long. Anal lobes moderately developed, set well apart. Antennae 7–8-segmented, 245–320 microns long. Legs normal, claw with a distinct denticle. Trochanter + femur 170–180 microns, tibia + tarsus 190–200 microns. Labium 70–90 microns long. Circulus small and round within borders of segment IV. Ostioles present, inner edges of lips sclerotized, each lip usually with 3 trilocular pores and an occasional seta. Anal ring with a double band of pores and 6 setae about twice length of diameter of ring. Marginal cerarii numbering 18 pairs, the cerarian setae on small projections of the derm. Anal lobe cerarii each with 2 conical setae on a large sclerotized plate nearly same size as anal ring, containing about 10 trilocular pores and 1 or 2 minute setae. Anterior cerarii each with 2 smaller

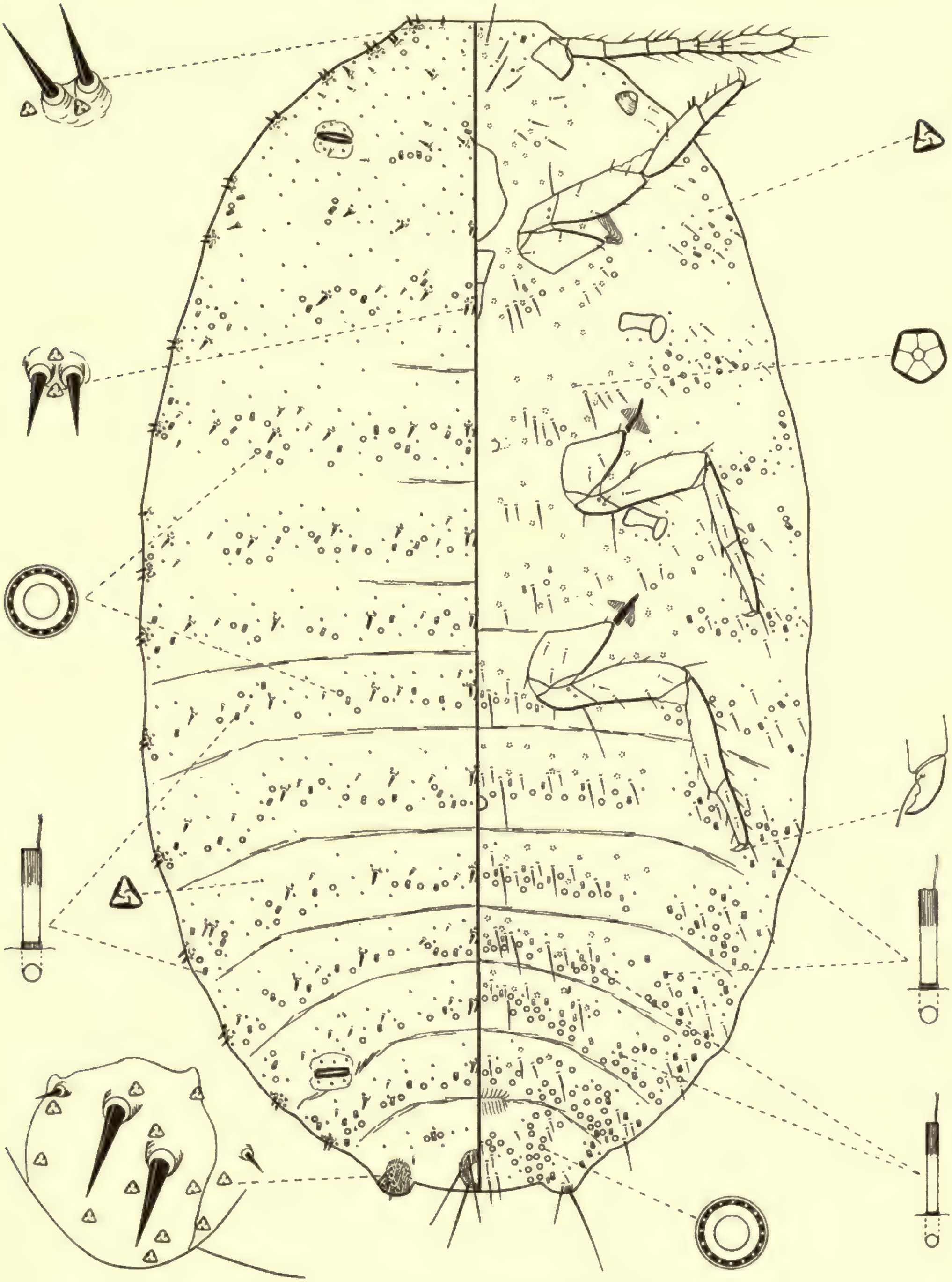

FIG. 21. *Spinococcus calluneti* (Lindinger).

conical setae set close together and with 2–4 trilocular pores immediately around the base, the base of each seta elevated from the surrounding derm.

Dorsal surface with setae of various sizes but of similar shape to cerarian setae. Dorsal cerarii each consisting of 2 conical setae situated on mid-line of body, these setae of same size as those of marginal cerarii. Similar sized setae in transverse rows, each with 1 or at most 2 trilocular pores on or near the basal projection ; occasionally replaced by definite cerarii with 2 setae. Other dorsal setae very small. Multilocular disc pores present in transverse rows on thorax and abdomen and a few scattered on head. Tubular ducts with a similar distribution to multilocular disc pores, a single duct usually situated between 2 multilocular pores. Trilocular pores evenly distributed, not numerous.

Ventral surface with apical setae longer than anal ring setae. Other setae slender, of various lengths but usually longer in median areas. Multilocular disc pores in transverse rows on abdominal segments but forming groups towards margins. Marginal groups also present on thorax and 1 or 2 pores situated near each coxa. Quinquelocular disc pores present in median areas only on head and thorax and all prevulvar abdominal segments. Trilocular pores few, absent in median areas of anterior abdominal segments and thorax. Tubular ducts with oral collar of two sizes. A larger type, similar to dorsal ducts, around the margin, there being usually a single duct between two multilocular disc pores. A smaller type, about half the width, mainly concentrated in median areas of abdomen but some extending laterally among the larger type. An occasional smaller duct also present in median areas of thorax.

NOTES. The identity of this species is based on specimens from Erlangen, Germany, collected by H. Schmutterer.

TRIONYMUS Berg

Trionymus Berg, 1899 : 78.
Trionymus Berg, Ferris, 1950 : 251, 1953 : 482.
Trionymus Berg, McKenzie, 1960 : 764.

Type of genus *Westwoodia perrisii* Signoret.

This genus has been a source of confusion in recent years. It is very close to *Dysmicoccus* and it is doubtful if the latter will be accepted when further species are described. Ferris laid particular stress on the shape of the circulus which, in *Trionymus*, should be small and round or oval whereas in *Dysmicoccus* it should be large and divided by an intersegmental fold. McKenzie has disregarded the shape of the circulus and species with 6 or more cerarii are placed in *Dysmicoccus* and those with 5 or less are placed in *Trionymus*.

McKenzie's interpretation is accepted here although difficulties arise with *T. newsteadi*. This species possesses 4 or 5 pairs of cerarii and has close affinities with the genus *Dysmicoccus* with regard to body form and the shape of the circulus. Furthermore, its host is *Fagus* and, although there are exceptions, most species of *Trionymus* are found on grasses. As it has no obvious relationship to its present genus *Pseudococcus*, it is left in *Trionymus* for the time being.

This is by far the largest British genus and the 9 species may be separated by the following key :

1 Anal lobe cerarii borne on a distinct sclerotized plate as large as or larger than area of anal ring 2
– Anal lobe cerarii not borne on a sclerotized plate 5
2 (1) Circulus large, divided by an intersegmental fold . . . . . ***tomlini*** Green
– Circulus small, round or oval, not divided by an intersegmental fold. . . . 3

3 (2) Multilocular disc pores absent on dorsum except for total of no more than 4–6 on some of last abdominal segments . . . . ***dactylis*** Green
– Multilocular disc pores on dorsum in transverse rows 4
4 (3) With 26–45 trilocular pores on the sclerotized plate on anal lobes ; tarsus about half length of tibia . . . . ***perrisii*** (Signoret)
– With 70–75 trilocular pores on the sclerotized plate on anal lobes ; tarsus about one-third as long as tibia . . . . ***phalaridis*** Green
5 (1) With 4 or 5 pairs of cerarii ; circulus large and quadrate-shaped ***newsteadi*** (Green)
– With 1 or 2 pairs of cerarii ; circulus small and round 6
6 (5) Tubular ducts with the oral collar nearly half total length of duct ***radicum*** (Newstead)
– Tubular ducts with the oral collar very small 7
7 (6) Multilocular disc pores absent on dorsum . . . . . ***thulensis*** Green
– Multilocular disc pores present on dorsum 8
8 (7) With a single pair of cerarii on anal lobes, cerarian conical setae slender ***orestes*** sp. n.
– With 2 pairs of cerarii, cerarian conical setae on anal lobes short and stout ***diminutus*** (Leonardi)

Trionymus dactylis Green

(Text-fig. 22)

Pseudococcus (*Trionymus*) *dactylis* Green, 1925 : 523.
Trionymus dactylis Green, Green, 1928 : 22.

HABIT AND DISTRIBUTION. Appearance in life not recorded. Known only from beneath the leaf sheaths of grasses. CHANNEL ISLANDS. Guernsey : St. Sampson, *Dactylis glomerata*, ix. 1924 (E. E. Green) (Type) ; Petit Bot Bay, *Deschampsia caespitosa*, ix. 1927 (F. Laing). ENGLAND. Somersetshire : Cheddar, *Dactylis glomerata*, viii. 1926 (E. E. Green).

RECOGNITION CHARACTERS. Body elongate elliptical attaining a length of 5 mm. Anal lobes moderately developed. Antennae 8-segmented, length 380–425 microns. Legs normal, slender, posterior coxae with numerous translucent pores, trochanter + femur 315–340 microns, tibia + tarsus 335–370 microns. Labium 75–80 microns long. Anterior and posterior ostioles present, each lip with 4–6 trilocular pores and usually without setae although at times one may be present. Circulus very small, oval. Anal ring with a double band of pores and 6 setae twice length of diameter of ring. Cerarii numbering 3 or 4 pairs. Anal lobe cerarii each with 2 conical setae on a sclerotized plate, larger in area than anal ring, containing 12 long setae and about 40 trilocular pores. Penultimate cerarii each with 2 smaller cerarian setae accompanied by about 12 trilocular pores and 2 or 3 auxiliary setae and surrounded by a small sclerotized area. Cerarii on segment VII similar but without sclerotized area. Cerarii on segment VI, when present, with 1 or 2 small cerarian setae and 2 or 3 trilocular pores.

Dorsal surface with slender setae of various sizes. Multilocular disc pores either absent entirely or numbering only 3–4 at most on posterior abdominal segments. Trilocular pores numerous. Tubular ducts with oral collar of 2 sizes. A larger type, quite numerous on all segments, tending to form transverse rows on abdominal segments but becoming scattered on thorax and head. A smaller type present on abdomen, sparse, in transverse rows in middle of segments and occasionally on thorax.

Ventral surface of body with apical setae longer than anal ring setae. Other setae of various sizes and similar to dorsal setae. Multilocular disc pores on fifth and posterior segments only, except for an occasional pore anteriorly. Tubular ducts of same 2 sizes as those on dorsum. A larger type in transverse groups or rows on fifth and posterior segments and forming rather large groups laterally. Marginal or submarginal groups also present as far forward as head. Occasionally single ducts may be present in median areas of thorax. A smaller type of duct

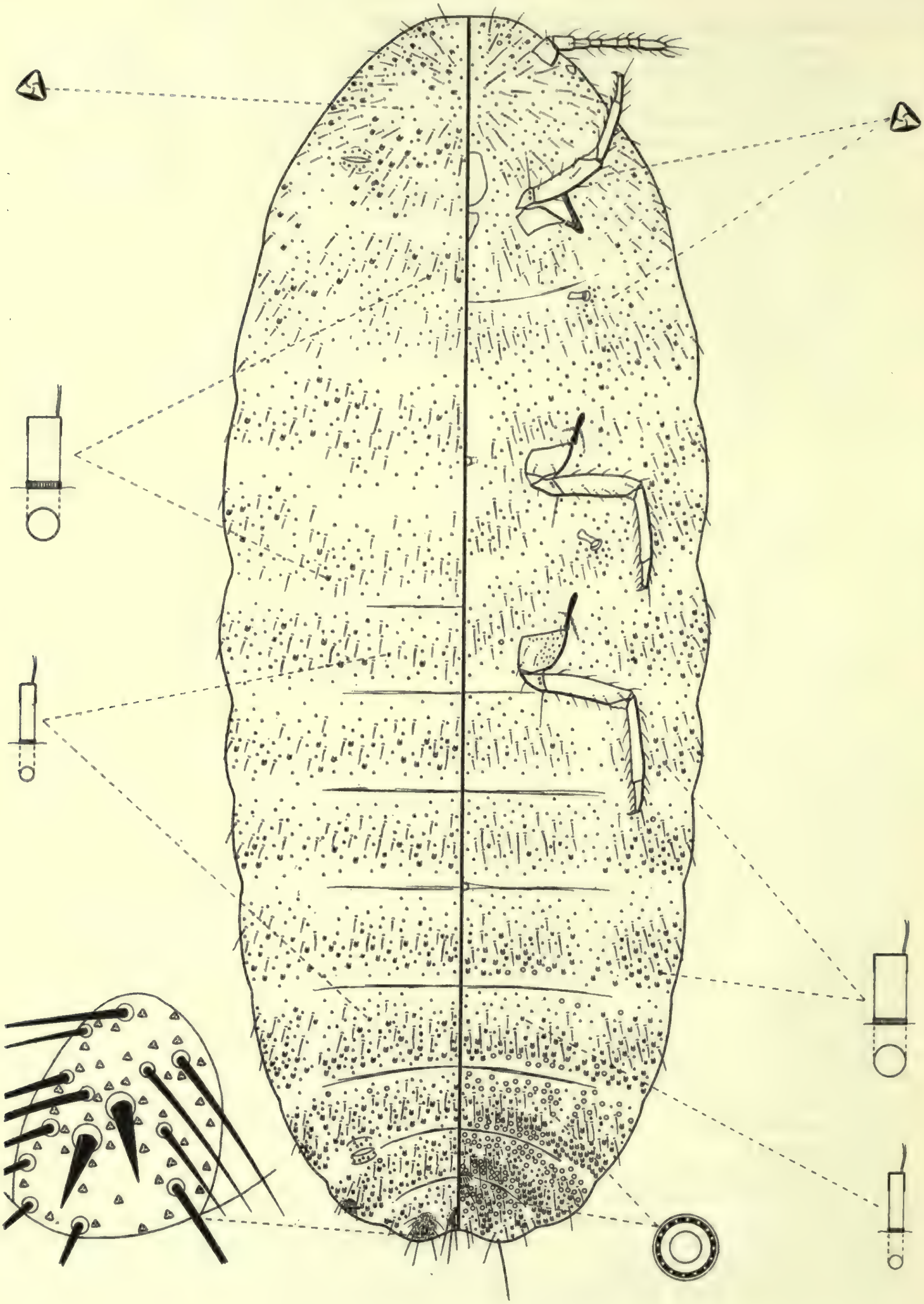

FIG. 22. *Trionymus dactylis* Green.

mainly present on abdomen across the middle of the segments, much fewer than larger type. Trilocular pores with an even distribution.

Trionymus diminutus (Leonardi)

Pseudococcus diminutus Leonardi, 1918 : 198.
Trionymus diminutus (Leonardi), Ferris, 1950 : 261.

Specimens are at hand from Channel Islands, Jersey (G. Fox-Wilson) on *Phormium tenax* to which plant it seems to be confined. It was described from Italy and is now known from New Zealand, U.S.A., Formosa and Russia. Ferris has redescribed and illustrated this species.

Trionymus newsteadi (Green)

(Text-fig. 23)

Pseudococcus newsteadi Green, 1917 : 265.
Trionymus newsteadi (Green), Zahradník, 1959 : 538.

Habit and distribution. Described as " Body pale purplish grey ; limbs and antennae pale stramineous ; venter thinly, dorsum rather thickly and evenly covered with white mealy secretion ; terminal three or four segments of abdomen with short, stout, waxy tassels." It is known only from beech. England. Surrey : Camberley, vii.1916, v.1917 (Type), 15.vi.1932 (E. E. Green). Buckinghamshire : Chartbridge (E. J. Joseph). Hertfordshire : Berkhamsted, 16.i.1913. Essex : Epping Forest, 25.v.1923 (C. L. Withycombe). Sussex : Midhurst, 18.v.1946 (W. J. Hall). Berkshire : Silwood Park, 31.v.1949 (K. L. Boratynski).

Recognition characters. Body broadly oval attaining a length of 3 mm., anal lobes moderately developed. Antennae 8-segmented, 340–410 microns long. Legs normal, posterior coxae and tibiae with a few translucent pores. Trochanter + femur 260–285 microns, tibia + tarsus 275–305 microns. Labium 105–120 microns long. Circulus large, posterior edge usually shorter than anterior edge. Posterior ostioles present only, each lip with 3 or 4 trilocular pores and apparently without setae. Anal ring with 2 rows of pores and 6 setae, these about twice length of diameter of ring. Cerarii numbering 4 or 5 pairs on abdomen. Anal lobe cerarii each with 2 slender conical setae and about 6 or 7 trilocular pores accompanied by 3 or 4 auxiliary setae, the area around the base of the setae sclerotized. Anterior cerarii on segments VI–VIII similar but cerarian setae smaller, auxiliary setae absent. Cerarii on fifth segment usually with setae similar to body setae and accompanied by about 3 trilocular pores.

Dorsal surface with slender setae. Tubular ducts numerous with deep collar occupying nearly one-third length of duct ; a flange-shaped membranous ring also arising from the inner end of the collar. The ducts and dorsal setae are arranged in definite groups rather than in transverse rows leaving bare areas except for trilocular pores which are more evenly distributed, as in the accompanying diagram.

Ventral surface with apical setae longer than anal ring setae. Body setae slender but mainly longer than those on dorsum. Multilocular disc pores confined to abdomen except for occasional pores near the coxae. Fifth segment with about 10–18 pores and posterior segments with transverse rows at anterior and posterior edges of segments. Tubular ducts of 2 sizes, a larger type similar to those on dorsum, rather numerous in marginal groups on abdomen and less numerous in groups around the thorax and head. Present also in transverse rows on fourth and posterior segments. A smaller type of duct, similar in all respects to larger type, sparsely distributed in median areas of posterior abdominal segments and occasionally on abdominal margins. Trilocular pores not numerous.

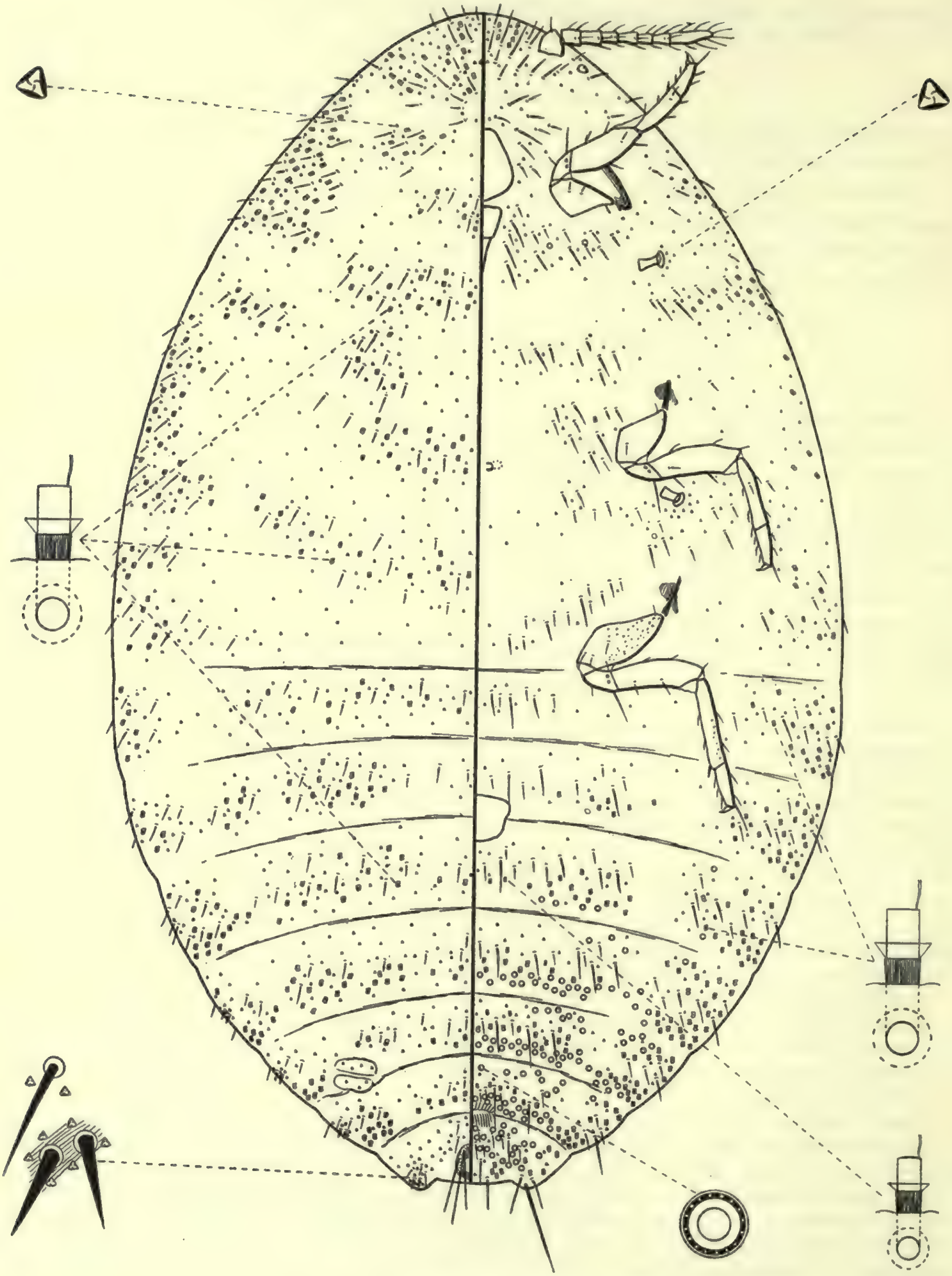

FIG. 23. *Trionymus newsteadi* (Green).

***Trionymus orestes* sp. n.**

(Text-fig. 24)

Trionymus pulverarius (Newstead), Green, 1928 : 30. (Misidentification.)

HABIT AND DISTRIBUTION. External appearance not known : probably found on the leaf sheaths. ENGLAND. Surrey : Box Hill, *Brachypodium sylvaticum*, 26.ix.1921 (E. E. Green) (Holotype). Somersetshire : Cheddar, *Brachypodium sylvaticum*, viii.1926 (E. E. Green).

RECOGNITION CHARACTERS. An elongate species attaining a length of 3·5 mm. in available specimens. Anal lobes poorly developed. Antennae 7-segmented, 275–310 microns long. Legs rather small and slender, posterior coxae with a few translucent pores. Trochanter + femur 200–230 microns, tibia + tarsus 230–260 microns. Labium 75–80 microns long. Ostioles small, each lip with about 3 trilocular pores and without setae. Circulus present, small and oval. Anal ring with a double band of pores and 6 setae, about twice as long as diameter of ring. Cerarii on anal lobes only, each with 2 conical setae set close together and about 5 trilocular pores accompanied by a longer auxiliary seta.

Dorsal surface with slender setae of various sizes, not numerous. Multilocular disc pores arranged more or less at anterior and posterior edges of abdominal segments in single or double transverse rows becoming less numerous anteriorly. A few also present in no definite arrangement on thorax and head. Trilocular pores evenly distributed. Tubular ducts with oral collar of 2 types, a larger type in transverse rows on abdomen except on segments IX + X ; present also on thorax and head where they have a random distribution. A smaller type, sparse, situated across the middle of abdominal segments except the last.

Ventral surface with apical setae longer than anal ring setae. Other ventral setae similar to those on dorsum but tending to be longer in median areas. Multilocular disc pores on posterior edges of segments V–VIII and on anterior edges of segments VI–VIII, present also on segments IX + X. Small marginal groups extending forward to head. Tubular ducts of two sizes as on dorsum. A larger type present mainly in marginal groups around body and a smaller type in transverse rows on abdomen and sometimes a few on thorax. Trilocular pores not numerous.

NOTES. This species is very close to *T. caricis* McConnell described from *Carex tribuloides*, Maryland, U.S.A., but differs in the greater number of dorsal multilocular disc pores which tend to form transverse rows on the abdominal segments. In *T. caricis* they are sparse and scattered.

Trionymus perrisii (Signoret)

(Text-fig. 25)

Westwoodia perrisii Signoret, 1875 : 337.
Dactylopius hibernicus Newstead, 1895 : 167 (**syn. n.**).
Trionymus perrisii (Signoret), Berg, 1899 : 78.
Dactylopius hibernicus Newstead, Newstead, 1903 : 172 (in part).
Dactylopius pulverarius (Newstead), Newstead 1903 : 174 (in part).
Pseudococcus pulverarius (Newstead), Green, 1915 : 178. (Misidentification.)
Pseudococcus hibernicus (Newstead), Green, 1920 : 120.
Trionymus pulverarius (Newstead), Green, 1926 : 182. (Misidentification.)
Trionymus hibernicus (Newstead), Green, 1926 : 183.
Trionymus pulverarius (Newstead), Green, 1928 : 30. (Misidentification.)

HABIT AND DISTRIBUTION. Living at the base of the leaf sheath of grasses. Adult dull yellow to pale purplish, dusted with a fine white powder. Short tassels on last

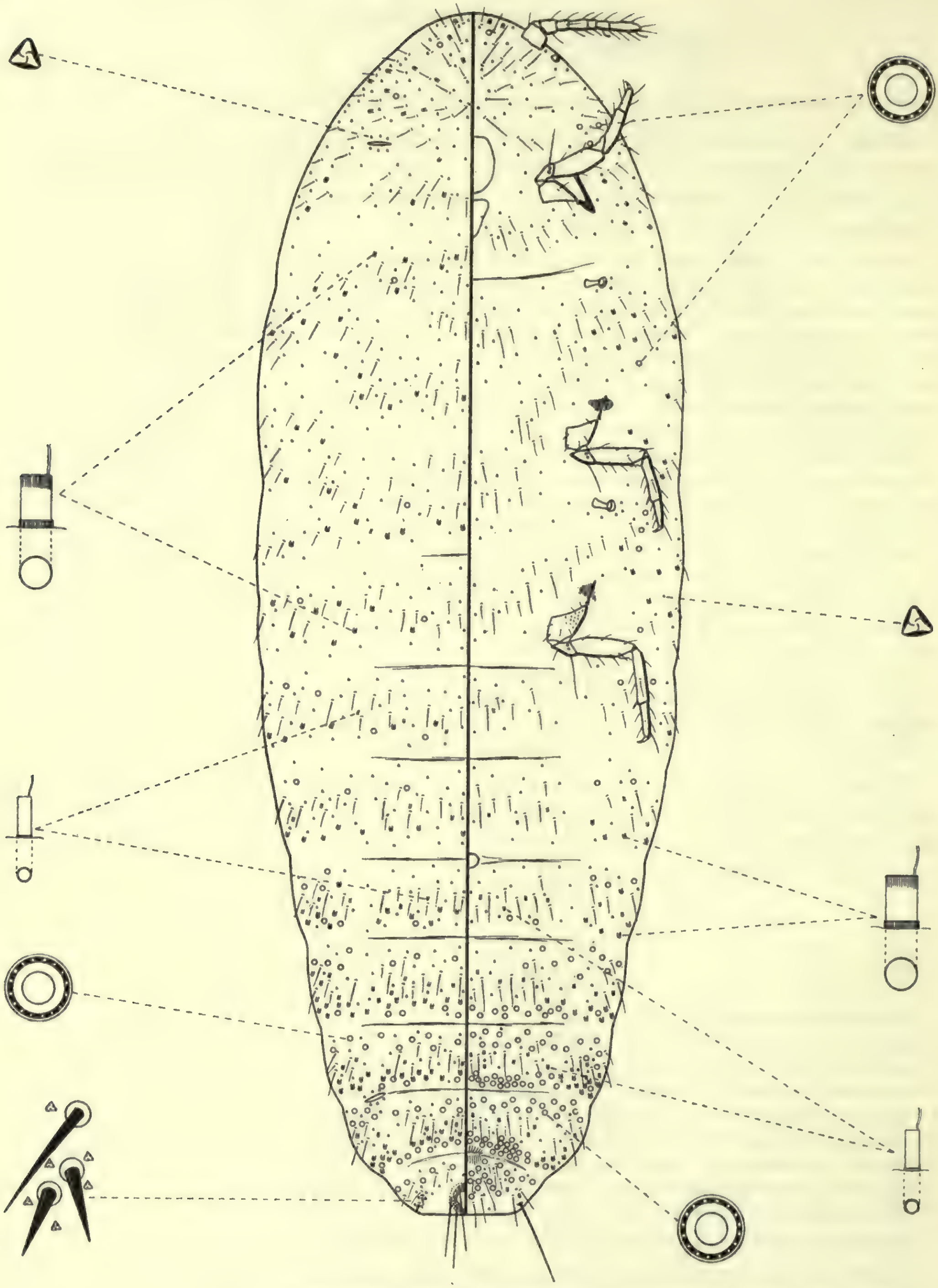

FIG. 24. *Trionymus orestes* sp. n.

two abdominal segments. This is, apparently, a common species in Britain and material has been examined from the following localities :

ENGLAND. Berkshire : Silwood Park, *Deschampsia caespitosa, Holcus* sp., 27.x.1948, *Festuca rubra*, 22.ix.1948, 13.ix.1953 (K. L. Boratynski). Cheshire : Helsby Hill, *Agrostis* sp., 1.viii.1896 (R. Newstead). Cumberland : Whinlatter Pass, *Deschampsia caespitosa* 10.viii.1960 (D. J. Williams). Devonshire : Budleigh Salterton, 10.ix.1896 (E. E. Green). Durham : Waldridge Fell, 7.viii.1960 (D. J. Williams). Kent : Deal, ix.1899 (B. Tomlin). Norfolk : Ingoldisthorpe, viii.1892, (R. Newstead). Somersetshire : Cheddar, viii.1926 (E. E. Green). Surrey : Guildford, 21.vii.1922 (E. E. Green) ; Camberley, ix.1914, 19.ix.1928, 26.ix.1930 (E. E. Green). Yorkshire : Selby, ix.1918 (E. E. Green). Hawkesworth, 15.viii.1958, 6.viii.1960 (D. J. Williams). SCOTLAND. East Lothian : Gullane, Aberlady, North Berwick Law, viii.1925 (E. E. Green). IRELAND. Antrim : Ballintoy, 3.ix.1893 (L. E. Tomlin) (*hibernicus* type).

RECOGNITION CHARACTERS. Adult female elongate oval, up to 4·5 mm. in length. Anal lobes usually well developed. Antennae 8-segmented, 335–340 microns long. Legs normal, posterior coxae with translucent pores, trochanter + femur 215–260 microns, tibia + tarsus 250–285 microns. Labium about 95 microns long. Anterior and posterior ostioles moderately developed, each lip with 4–6 trilocular pores and rarely with setae. Circulus present, small and oval between fourth and fifth segments. Occasionally a second smaller circulus may be present on the next posterior segment and very rarely up to 4 circuli present in which case the extra ones are minute. Anal ring with 2 rows of pores and 6 setae twice as long as diameter of ring. Cerarii numbering 2 or 3 pairs. Anal lobe cerarii each with 2 conical setae on a sclerotized plate, slightly larger in area than anal ring. This plate also containing about 26–45 trilocular pores and 9 auxiliary setae. Cerarii on segment VIII each with a pair of smaller conical setae and on a small sclerotized plate with 8 trilocular pores and about 2 auxiliary setae. On segment VII cerarii often absent entirely but when present, with either 1 or 2 conical setae and 2 or 3 trilocular pores and not surrounded by a sclerotized area.

Dorsal surface with slender setae. Multilocular disc pores variable in number and distribution. On the abdomen they form transverse rows at the anterior and posterior edges of segments VI–VIII. On the anterior abdominal segments they become sparse and may be missing entirely on some of the edges. On the thorax they become scattered and sometimes they are present on the head. Trilocular pores rather numerous. Tubular ducts with oral collar of 2 sizes. A smaller-sized duct sparse, there being a few across the middle of most abdominal and thoracic segments. A larger type of duct, numerous, forming transverse bands on the abdominal segments. In some specimens they reach from the anterior to posterior edges of most segments but in other specimens they are concentrated in the middle of the segments or towards the posterior edges. On the thorax and head they are less numerous and become scattered.

Ventral surface with apical setae longer than anal ring setae. Ventral setae slender but tending to be longer than dorsal setae. Multilocular disc pores numerous in transverse rows at anterior and posterior edges of segments VI–VIII ; present also on segments IX + X and on posterior edge of segment V. Elsewhere on the abdomen they are sparse and may be present or absent around the margins. On the thorax and head they are scattered on median areas and often extend around margins. Trilocular pores evenly distributed. Tubular ducts, of smaller type, present in middle of abdominal segments and in median areas of thorax ; not numerous. A larger type in transverse rows and marginal groups on abdominal segments and extending around body in a marginal or submarginal zone.

NOTES. Dr. A. Reyne has very kindly sent specimens of *T. perrisii* from Holland and these agree with specimens of *T. hibernicus* described from Britain. Professor N. S. Borchsenius has also kindly examined some British specimens of *T. hibernicus*

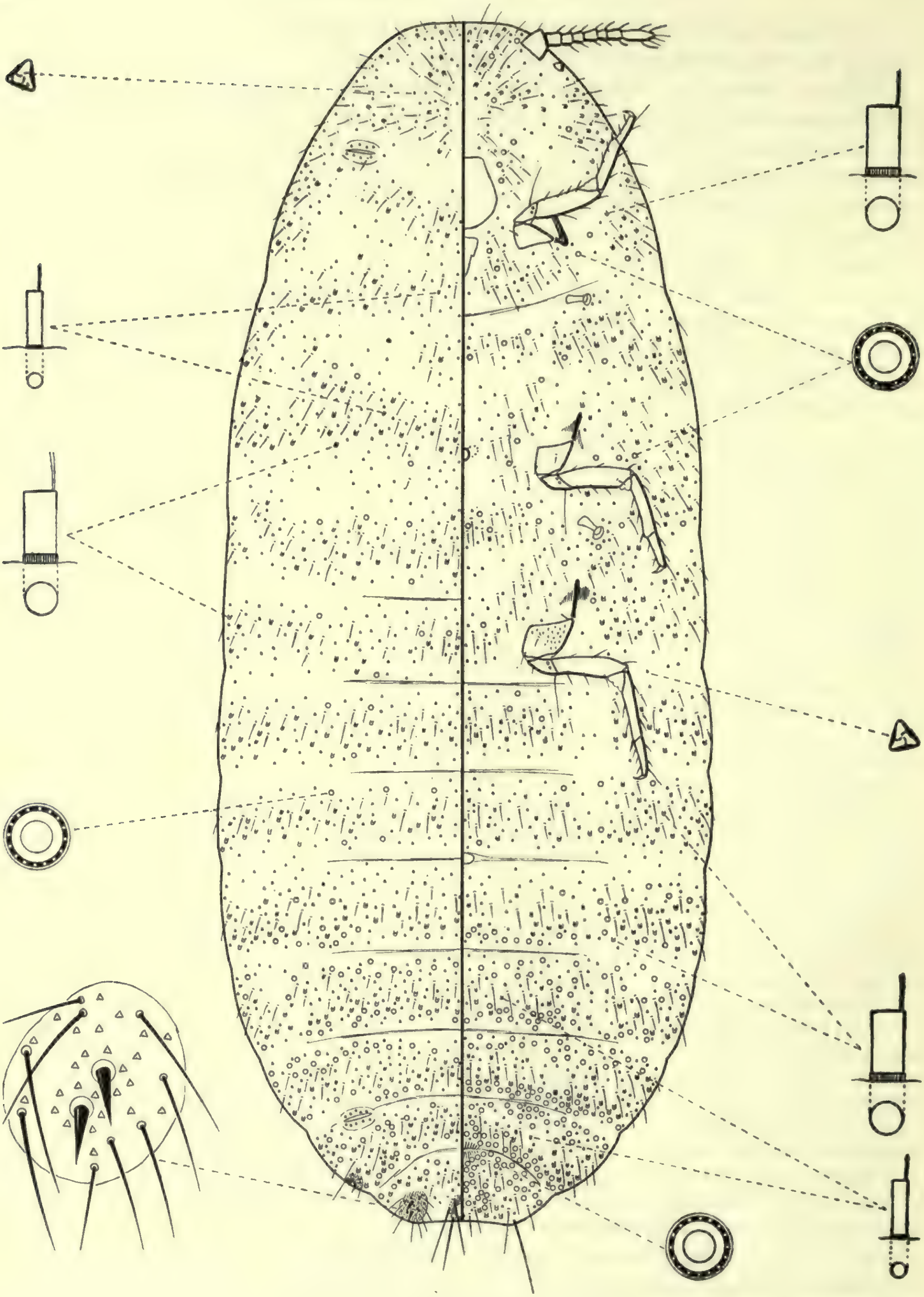

FIG. 25. *Trionymus perrisii* (Signoret).

and it is his opinion that they are the same as *T. perrisii*. All of these specimens agree with the illustration of *T. perrisii* given by Marchal (1908).

Continental specimens usually have 3 distinct pairs of cerarii but on at least 1 specimen from Holland there are only 2 pairs. British specimens usually have 2 pairs of cerarii but the third pair is often represented by a single conical seta and 2 or 3 trilocular pores. Although a single circulus seems to be the more normal condition, some specimens in Britain have 2 and in rare cases up to 4.

Trionymus phalaridis Green

(Text-fig. 26)

Pseudococcus (*Trionymus*) *phalaridis* Green, 1925*a* : 37.

Habit and distribution. Described as "Colour reddish purple to dark slaty grey ; closely dusted with white powdery secretion. Posterior extremity with four short waxy tassels." Living beneath the leaf sheath and stem. England. Surrey : Frimley, 8.ix.1922 (E. E. Green) (Type) ; Camberley, 30.viii.1921, 30.ix.1921 (E. E. Green), all on *Phalaris arundinacea*. Gloucestershire : ix.1922 (K. G. Blair).

Recognition characters. Body elongate, sides subparallel, attaining a length of 6·5 mm. Anal lobes well developed. Antennae 8-segmented, 450–495 microns long. Legs rather long and slender, posterior coxae with a few translucent pores, trochanter + femur 380–395 microns, tibia about 3 times as long as tarsus, measuring together 405–445 microns. Labium 100 microns long. Ostioles present, usually with about 10–15 trilocular pores on each lip of posterior pair and about 4–6 on each lip of anterior pair ; without setae. Circulus oval. Anal ring with a double band of pores and 6 setae over twice length of ring at its greatest diameter. Cerarii on last 2 segments only. Anal lobe cerarii each with 2 conical setae on a large sclerotized plate, larger in area than anal ring and accompanied by 70–75 trilocular pores and 12 or 13 slender auxiliary setae. Penultimate cerarii each with 2 smaller conical setae on a small round sclerotized plate containing about 15 trilocular pores and 5 auxiliary setae.

Dorsal surface of body with numerous slender setae of various sizes. Multilocular disc pores arranged in transverse rows at anterior edges of segments V–VIII and with only a few at posterior edges of these segments. On the anterior abdominal segments and thorax they are sparse and become scattered. Trilocular pores numerous and evenly distributed. Tubular ducts with oral collar of 2 sizes. A smaller type, few on abdomen, situated mainly across middle of segments. A larger type abundant, occupying most of the area of segments II–VIII except at anterior edges. On the thorax they become scattered but are well separated between the segments and on the head they lie in definite groups.

Ventral surface with a pair of apical setae longer than anal ring setae. Slightly shorter setae present around margins of abdomen. Other ventral setae of various sizes but all slender. Multilocular disc pores numerous on segments IX + X, in transverse rows at anterior and posterior edges of segments VI–VIII, and on posterior edges of segment V. A few also present on segment IV, around the margins to head and occasionally in median areas of thorax. Trilocular pores numerous. Tubular ducts of same 2 sizes as on dorsum. A smaller type sparse on abdomen and a larger type in transverse rows and marginal groups on the abdominal segments. Present also in groups around the margins to head and a few in median areas of thorax.

Notes. This species comes close to *T. perrisii* but is usually much larger. The trilocular pores on the sclerotized plate on anal lobes are much more numerous and the tibia is about three times as long as the tarsus whereas in *T. perrisii* it is only twice as long.

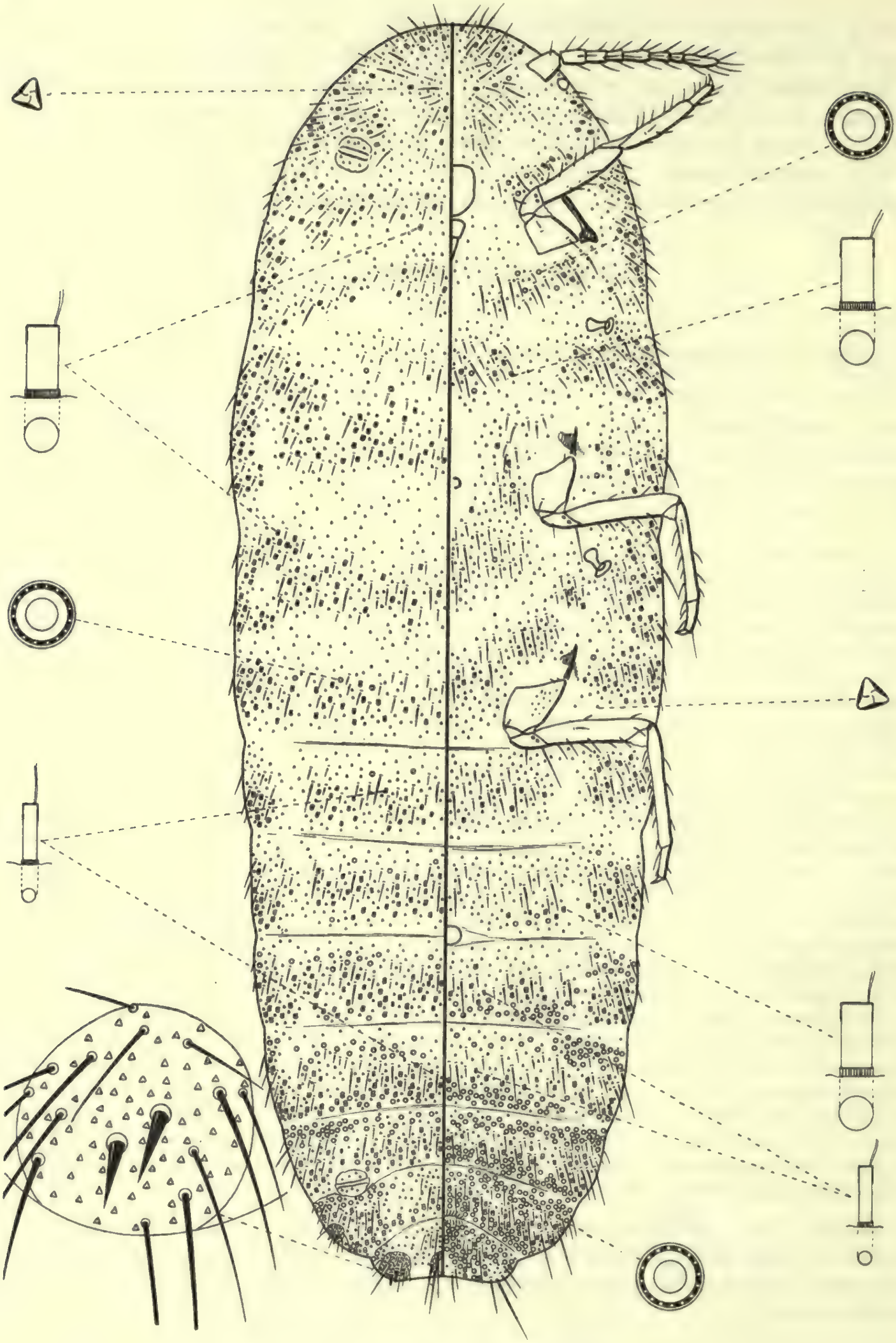

FIG. 26. *Trionymus phalaridis* Green.

Trionymus radicum (Newstead) (**comb. n.**)

(Text-fig. 27)

Dactylopius radicum Newstead, 1895*b* : 235.
Dactylopius hibernicus Newstead, Newstead, 1903 : 172 (in part, misidentification).
Ripersia donisthorpei Newstead, *In* Donisthorpe, 1907 : 5 (**syn. n.**).

HABIT AND DISTRIBUTION. Living at the base of grasses. Described originally as " pale reddish-pink . . . At period of gestation the ♀ completely envelops herself in a very loose cottony material, in which the pale flesh-coloured ova are laid." ENGLAND. Isle of Man : Port Erin, 21.ix.1918. Buckinghamshire : Waddesdon, 17.v.1953 (V. F. Eastop). Kent : Charing, in nest of *Ponera contracta* (H. Donisthorpe) (*donisthorpei* Type). WALES. Anglesey : Puffin Is., vi.1895 (*radicum* Type).

RECOGNITION CHARACTERS. Body elongate oval, about 3·5 mm. long. Anal lobes moderately developed. Antennae 7-segmented, 305–335 microns long. Legs normal, slender, hind coxae with a few translucent pores. Trochanter + femur 215–240 microns, tibia + tarsus 225–245 microns. Labium 70–75 microns long. Ostioles poorly developed with 4–7 trilocular pores on each lip and rarely with setae. Circulus very small, oval. Anal ring with a double band of pores and 6 setae longer than ring at its greatest diameter. Cerarii numbering 2 pairs only. Anal lobe cerarii each with a pair of conical setae and about 6 or 7 trilocular pores accompanied by a single auxiliary seta, the area between the cerarian setae sclerotized. Cerarii on segment VIII each with a pair of smaller conical setae and about 4 trilocular pores.

Dorsal surface of body with short slender setae, not numerous. Multilocular disc pores very few, scattered at random on thorax and abdomen. Trilocular pores evenly distributed. Tubular ducts arranged in transverse rows on thorax and abdomen and in groups on head, each duct with a large flange-shaped collar occupying nearly half total length of duct.

Ventral surface with apical setae longer than anal ring setae. Ventral setae all slender but mainly longer than dorsal setae. Multilocular disc pores numerous on segments IX + X and present in transverse rows at posterior edges and usually on anterior edges of segments V–VIII. Small numbers also on anterior abdominal segments and around the margins to head and one or two in median areas of thorax. Tubular ducts of 2 sizes ; a larger type, similar to dorsal ducts situated in groups around the margins and a few present in median areas of segments V–VIII. A smaller type of duct, similar to the larger type but with inner end rounded, present on abdomen mainly in the median areas.

NOTES. When Newstead collected this species he also found some smaller specimens which he thought were the larvae. They were, however, adult females of *Rhizoecus halophilus* and he mentioned this error in 1903. In this same work he sunk the name *Dactylopius radicum* as a synonym of *D. hibernicus*, stating that the " curiously shaped pores or glands " were caused by a parasite. The species is quite distinct and the tubular ducts, with the collar flange-shaped and nearly half the total length of the duct, serve to distinguish this species from all the other British species of *Trionymus*.

Trionymus thulensis Green

(Text-fig. 28)

Trionymus pulverarius (Newstead), Green, 1926 : 182. (Misidentification.)
Trionymus thulensis Green, 1931*a* : 267.

HABIT AND DISTRIBUTION. Found beneath the leaf sheath and stem of grasses. Described originally from Iceland, Varmahlið on *Festuca rubra*, 3.vi.1929 (C. H. Lindroth). British specimens are at hand from the following localities : ENGLAND.

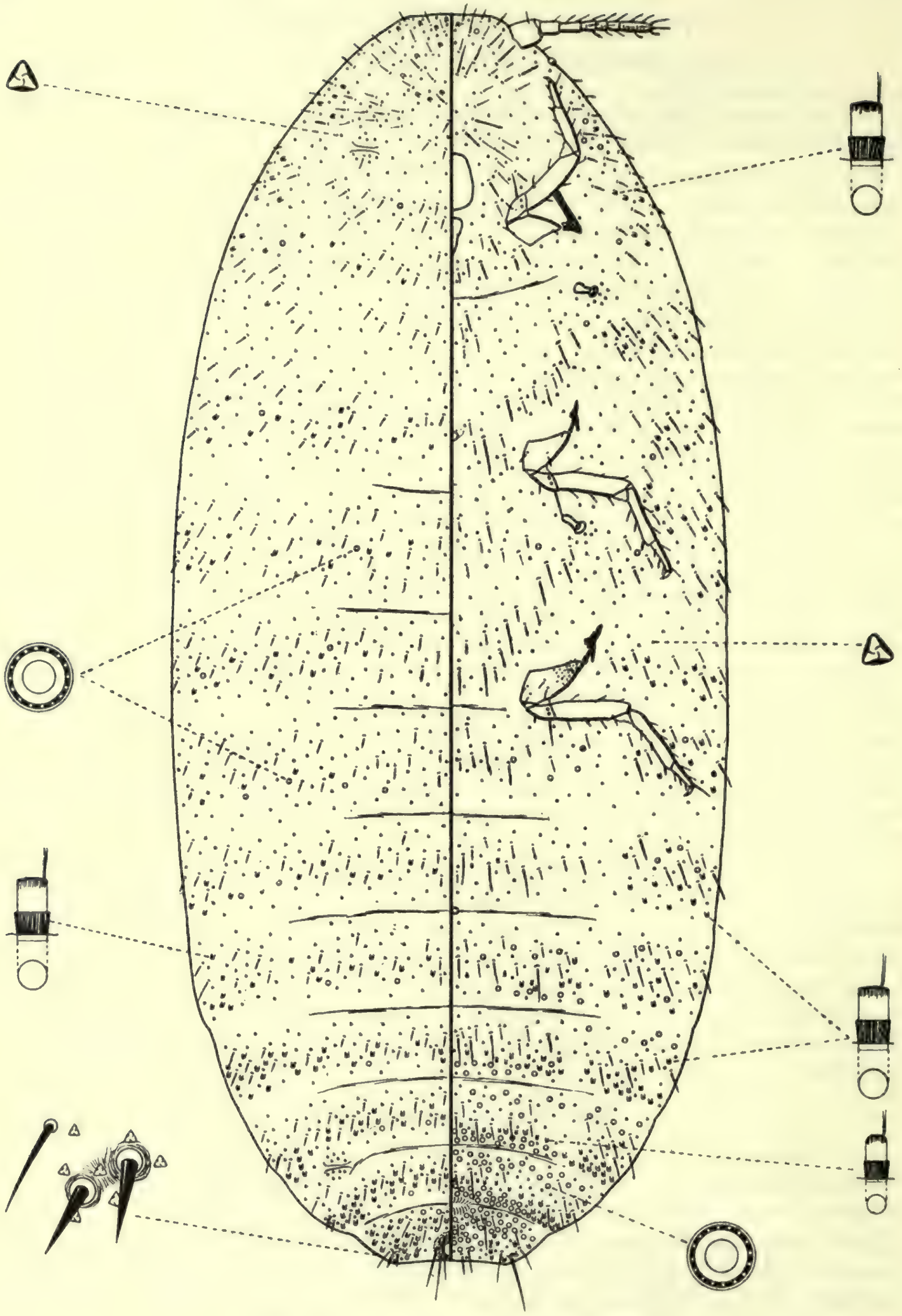

FIG. 27. *Trionymus radicum* (Newstead).

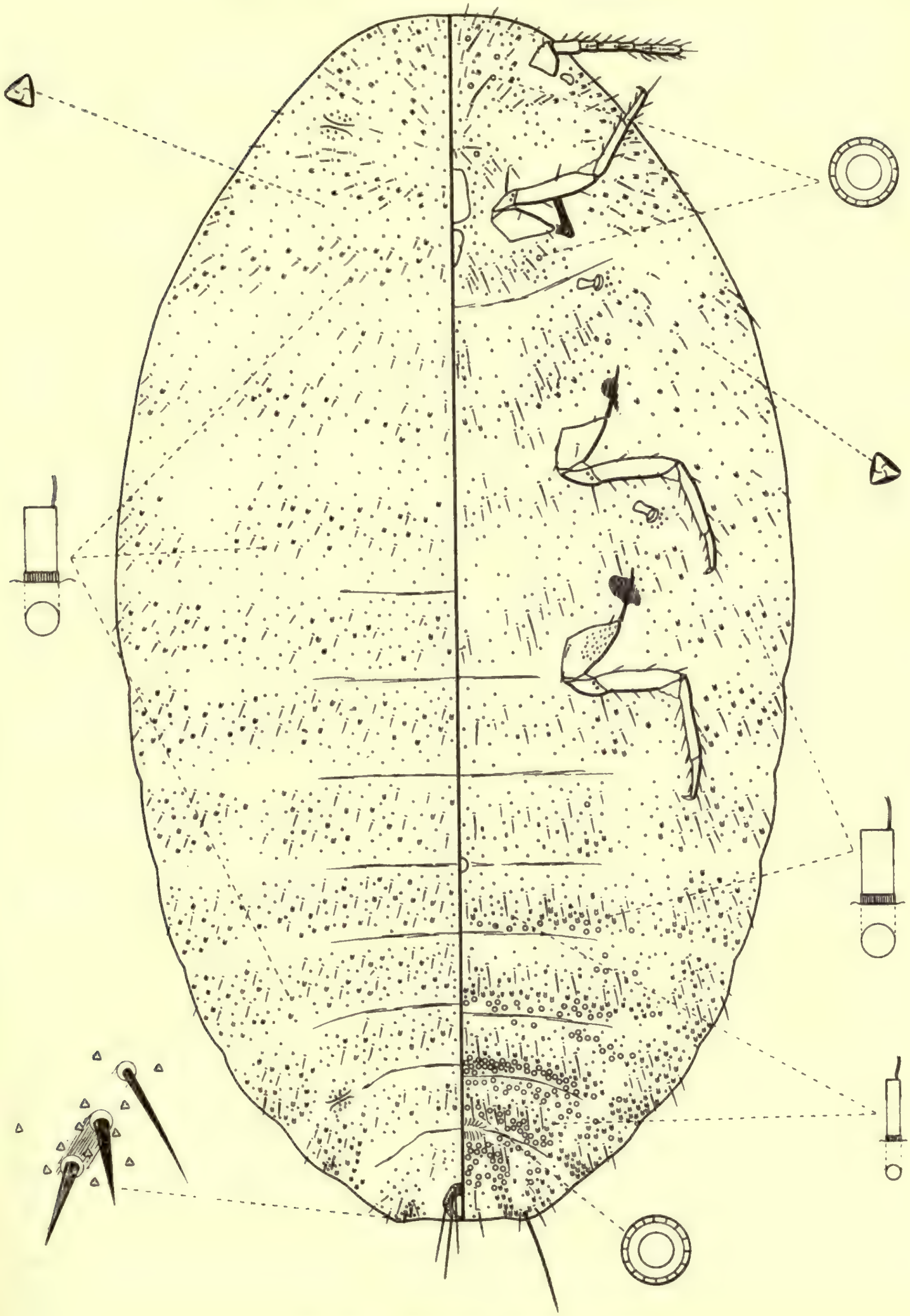

FIG. 28. *Trionymus thulensis* Green.

Berkshire : Silwood Park, *Holcus mollis*, 31.v.1951 (K. L. Boratynski). Durham : Low Fell, vi.1943 (R. S. Bagnall). Kent : Thurnham, *Trisetum flavescens*, 13.vii.1921 (E. E. Green). Isle of Wight : Seaview, 3.ix.1921 (E. E. Green). Norfolk : Snettisham, 18.vii.1895 (R. Newstead). Northumberland : Alnmouth, 2.iii.1935 (R. S. Bagnall). Surrey : Camberley, 5.ix.1923, vii.1929, 23.vii.1932 (E. E. Green). Yorkshire : Askham Bog, *Agrostis tenuis*, 22.vi.1956 (D. J. Williams). WALES. Brecknockshire : Llangammarch, vi.1926 (E. Earle).

RECOGNITION CHARACTERS. Body elongate elliptical to elongate oval, attaining a length of 4 mm. Antennae 7- or 8-segmented, length about 380 microns. Labium 80–95 microns long. Legs normal, posterior coxae with a few translucent pores ; trochanter + femur 265–285 microns, tibia + tarsus 285–320 microns. Circulus small and round. Ostioles with about 6 trilocular pores on each lip and without setae. Anal ring with 6 setae twice as long as diameter of ring. Cerarii present on last 2 abdominal segments. Anal lobe cerarii each with a pair of conical setae, a small cluster of 7 or 8 trilocular pores, not on a sclerotized plate but small area between the setae sclerotized. Accompanied also by a single auxiliary seta immediately above cerarian setae. Cerarii on segment VIII with 2 smaller conical setae and about 6 or 7 trilocular pores and no auxiliary setae.

Dorsal surface of body with short slender setae. Multilocular disc pores absent. Trilocular pores not numerous, evenly distributed. Tubular ducts with oral collar of one size ; absent on segments IX + X but present on all anterior abdominal segments and thorax in transverse bands and tending to become scattered on head. In some specimens they are quite sparse on thorax and head.

Ventral surface of body with a stout pair of apical setae longer than anal ring setae. Other ventral setae slender but mainly longer than on dorsum ; not numerous. Multilocular disc pores present on segments IX + X and in transverse rows at posterior edges of segments V–VIII in median areas. Present also at anterior edges of segments VI–VIII and occasionally in median areas of anterior abdominal segments, thorax and head. Tubular ducts of 2 sizes, a larger type, similar to dorsal ducts, numerous in groups around margins to head and also in transverse rows on abdominal segments. Some also present in median areas of thorax. A smaller type of duct less numerous, situated in median areas of abdominal segments and sometimes among the lateral groups of the larger ducts.

NOTES. This species is, apparently rather common in Britain, and has been misidentified in the British literature as *T. pulverarius* (Newstead). The illustration has been prepared from specimens collected at Askham Bog, Yorkshire, which agree well with the type. Some other specimens studied show fewer multilocular disc pores and tubular ducts but these represent an extreme in variation.

Trionymus tomlini Green

(Text-fig. 29)

Pseudococcus (*Trionymus*) *californicus* Ehrhorn, Green, 1925 : 522. (Misidentification.)
Pseudococcus (*Trionymus*) *tomlini* Green, 1925 : 525.

HABIT AND DISTRIBUTION. External appearance not known. Found beneath the leaf sheaths of grasses. CHANNEL ISLANDS. Guernsey : Port Grat, *Psamma arenaria* (=*Ammophila arenaria*), ix.1925 (J. R. le B. Tomlin) (Type) ; Vazon Bay, *Agropyron repens*, ix.1924. ENGLAND. Isle of Man : Dalby in sandy shingle above high water mark ix.1922 (L. E. Tomlin).

RECOGNITION CHARACTERS. An elongate oval species measuring about 3·5 mm. long. Anal lobes moderately developed. Antennae 8-segmented, 425 microns long. Legs rather long,

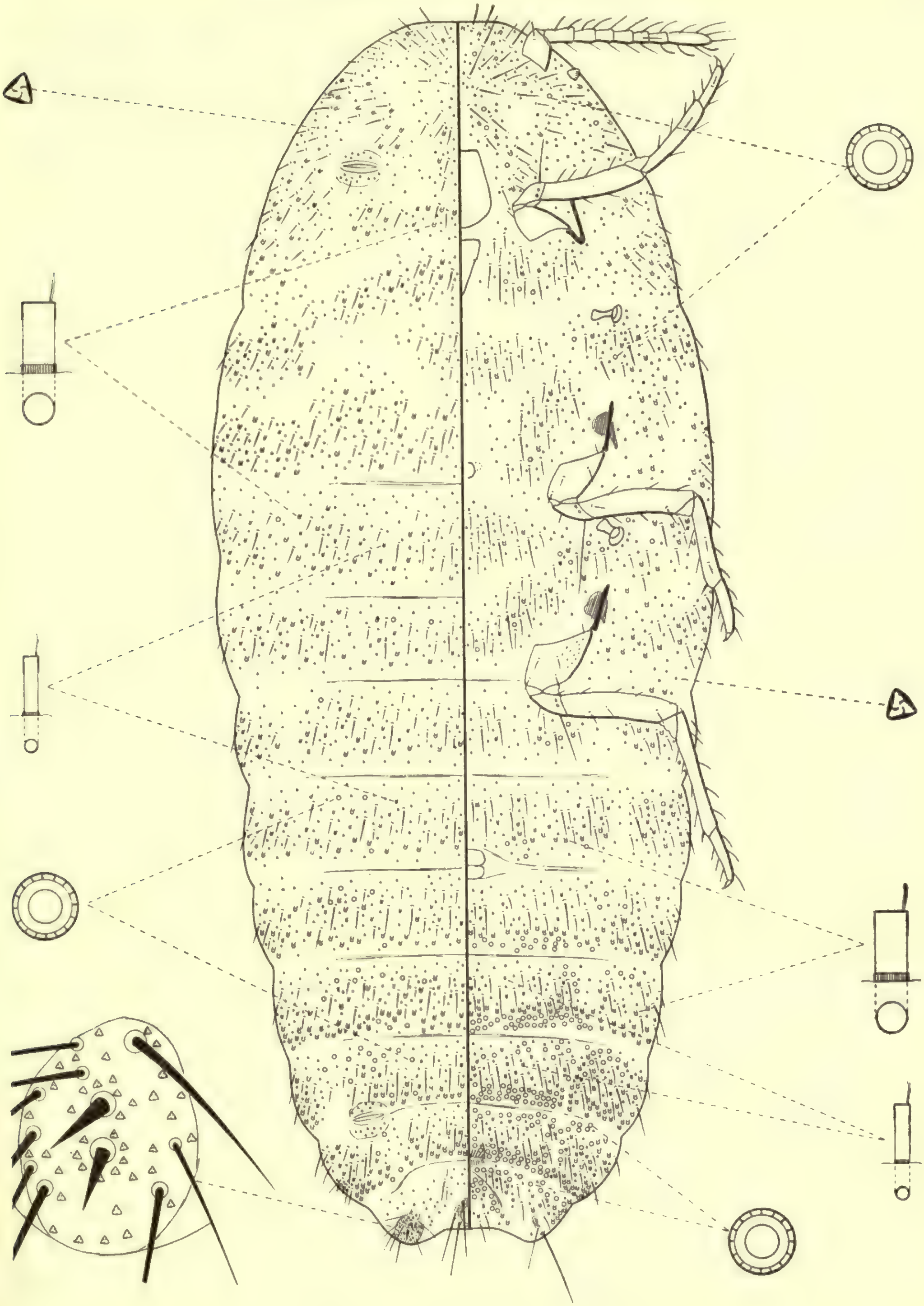

FIG. 29. *Trionymus tomlini* Green.

posterior coxae with a few translucent pores. Trochanter + femur 285–340 microns, tibia + tarsus 355–370 microns. Labium about 95 microns long. Anterior and posterior ostioles present, each lip with 6–8 trilocular pores, usually without setae but occasionally present. Circulus large and oval with a distinct intersegmental fold. Anal ring with 6 setae about twice length of its diameter. Cerarii numbering 2 pairs. Anal lobe cerarii each with 2 conical setae on an oval sclerotized plate nearly as large as anal ring and containing about 35–42 trilocular pores and 8 or 9 auxiliary setae. Penultimate cerarii not on a sclerotized area, each with 2 smaller conical setae, about 15 trilocular pores and 2 or 3 auxiliary setae.

Dorsal surface with slender setae of various sizes. Multilocular disc pores absent on segments IX + X and present at anterior and posterior edges of the other abdominal segments in no definite pattern ; not numerous and becoming sparse on anterior abdominal segments ; a few also present on thorax. Trilocular pores evenly distributed. Tubular ducts with oral collar of 2 sizes. A smaller type, not numerous, in middle of abdominal segments except IX + X and also present on thorax. A larger type of duct more numerous, arranged on segments II–VIII mainly in transverse rows on posterior edges and in marginal groups, but a few also present towards anterior edge of each segment. On the meta- and mesothorax they become scattered and on the prothorax and head form definite groups.

Ventral surface with apical setae longer than anal ring setae ; each anal lobe also with a small sclerotized patch which is not attached to the apical seta. Body setae rather numerous, all slender, of various sizes but mainly long. Multilocular disc pores numerous on abdomen, present on segments IX + X and in transverse rows at posterior edges of segments IV–VIII. Situated also on anterior edges of segments VI–VIII and a few present on anterior abdominal segments and in median areas of thorax and head. Tubular ducts of same two types as on dorsum. A smaller type on abdomen, mainly across the middle of each segment. A larger type present in transverse rows at posterior edges of abdominal segments and in marginal groups which extend to head. Groups also present in median areas of thorax and head.

NOTES. In its general distribution of pores and ducts, this species comes very close to *T. perrisii* but differs in the form of the circulus which is quite large and divided by an intersegmental fold, whereas the circulus of *T. perrisii* is small and oval. It seems to have close affinities with *T. modocencis* (Ferris) and *T. haancheni* McKenzie, described from the U.S.A. which also have 2 pairs of cerarii and a large divided circulus. In this respect *T. tomlini* comes closest to *T. haancheni* but possesses more numerous multilocular disc pores on the dorsum, and on the venter they extend to the thorax and head whilst in *T. haancheni* they are present on the abdomen only.

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NEW AFRICAN CADDIS-FLIES
(Order TRICHOPTERA)

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D. E. KIMMINS

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ENTOMOLOGY Vol. 12 No. 2
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BY

D. E. KIMMINS

British Museum (Natural History)

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NEW AFRICAN CADDIS-FLIES (Order TRICHOPTERA)

By D. E. KIMMINS

SYNOPSIS

This paper deals mainly with species of the subfamilies Oestropsinae and Leptocerinae and includes a lectotype designation and redescription of the male genitalia of *Phanostoma senegalense* Brauer and a redescription and figures of the female holotype of *Setodellina albopunctata* Lestage. The synonymy of the genus *Phanostoma* Brauer with the genus *Amphipsyche* McLachlan is confirmed and four new species of the latter genus are described. The genus *Chloropsyche* McLachlan is placed as a synonym of *Aethaloptera* Brauer. A revised key to the African genera of the Leptocerinae is given and the genus *Setodellina* is synonymized with *Oecetis*.

THIS paper is based upon material sent for identification by Dr. Marjorie Scott (South Africa), Dr. Philip S. Corbet (Uganda) and on British Museum (Nat. Hist.) accessions. The author wishes to express his thanks to Drs. Scott and Corbet for their generosity in presenting to the British Museum (Nat. Hist.) the types of the new species based upon their material, in addition to other duplicate material. Paratypes of South African material (where available) have been returned to Dr. Marjorie Scott, and will in due course be deposited in the South African Museum.

The South African material was collected by the following workers: Messrs. John Agnew, Brian Allanson, Mark Chutter, Dr. A. D. Harrison and Mr. W. D. Olliff, in addition to Dr. Scott herself, but the individual collectors' names are not given on the locality labels.

For the loan of the type series of *Phanostoma senegalense* Brauer the author is indebted to Dr. M. Beier, Naturhistorisches Museum, Vienna, and for the loan of the type of *Setodellina albopunctata* Lestage to Dr. P. Basilewsky, Musée Royale de l'Afrique centrale, Tervuren, Belgium.

Family **PSYCHOMYIIDAE**

Paduniella ankya Mosely

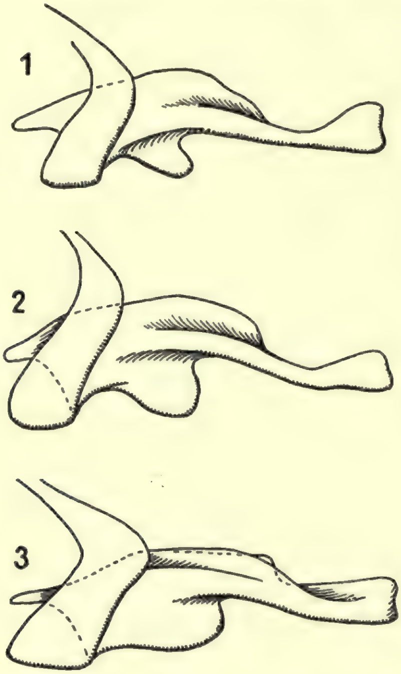
Two males, one from Volksrust and the other from the Natal National Park, are referred to this species. The genitalia do not entirely agree with the original description and figures, but I do not consider the differences to be specific. The shape of the clasper of the Natal specimen is intermediate between that of the type specimen and that of an example from the Semliki Forest. The locality of the type (Namwamba Valley) and the Semliki Forest are both in the Ruwenzori region.

Family **HYDROPSYCHIDAE**

Subfamily **OESTROPSINAE**

THE GENERA ***AMPHIPSYCHE*** McLACHLAN AND ***PHANOSTOMA*** BRAUER

These two genera were originally separated on the difference in the tibial spur formula (*Amphipsyche* 1.4.4, *Phanostoma* 2.4.2) and on the presence of a weak "false discoidal cell" in *Phanostoma*. As additional species of *Amphipsyche* were discovered in Asia, it became evident that the tibial spur formula was not a constant feature of the genus, and Martynov (1935 : 201) proposed that the genus *Phanostoma* should be considered a synonym of *Amphipsyche*. This was not generally accepted and Ulmer (1951 : 197) maintained *Phanostoma* as a distinct genus on the grounds of the false discoidal cell in the fore wing and the tibial spur formula of 2.4.2. I have been able to study the type-series of *Phanostoma senegalense* Brauer and find that Brauer was incorrect in stating that there were two very small tibial spurs on the anterior tibia. Microscopic examination reveals neither spurs nor spur-bases on the inner apical angle of the fore tibia. There is however a variable number of microscopic spines on the outer apical angle, which Brauer may have taken for apical spurs. The spur formula of *Phanostoma senegalense* Brauer is therefore 0.4.2,



FIGS. 1–3. *Paduniella ankya* Mosely, ♂ clasper from left. 1, Ruwenzori, Semliki Forest ; 2, Ruwenzori, Namwamba Valley (Type) ; 3, Natal National Park.

which falls within the range admitted by Ulmer for *Amphipsyche*. It is at times difficult to decide whether a false discoidal cell is present and both genera have the intermediate tibiae and tarsi of the male moderately flattened.

I therefore adopt Martynov's proposal and to combine the genera *Amphipsyche* and *Phanostoma*. The synonymy is as follows :

AMPHIPSYCHE McLachlan, 1872

McLachlan, 1872 : 68, pl. 2, figs. 7–7*e*.
Type-species (monotypic) ***Amphipsyche proluta*** McL., 1872.
Phanostoma Brauer, 1875 : 69, pl. 4, figs. 5–5*e*.
Type-species (monotypic) ***Phanostoma senegalense*** Brauer, 1875.
? ***Amphipsychella*** Martynov, 1935 : 201.
Type-species (monotypic) ***Amphipsychella extrema*** Martynov, 1935.

Spur formula ♂, ♀, 1.4.4, 1.4.3, 1.4.2, 0.4.3, 0.4.2. Mid-tibia and first three basal tarsal segments moderately flattened in ♂, strongly so in ♀. Maxillary palpi weak, rather short. Aedeagus with or without parameres. (*A. proluta* and *A. senegalensis* are certainly without spine-like parameres, nor does Martynov's figure of *A. distincta* give any indication of them. The four new African species have such parameres, as do *A. indica* Mart. and *A. bengalensis* Mart.)

Key to African Species of *Amphipsyche* (Males)

1 Stem of R_{2+3} in fore wing closely approximated to R_4 ; aedeagus without spiniform parameres . . . . **senegalensis** (Brauer)
– Stem of R_{2+3} in fore wing widely separated from R_4 ; aedeagus with two spiniform parameres 2
2 Lobes of tenth segment, in dorsal view, arising from broad, shouldered bases . . . 3
– Lobes of tenth segment, in dorsal view, not arising from broad bases 4
3 Lobes of tenth segment parallel in dorsal view, deep in side view . . . **corbeti** sp. n.
– Lobes of tenth segment divergent in dorsal view, narrow in side view . **berneri** sp. n.
4 Apex of aedeagus, in side view, strongly clavate, parameres angled abruptly upwards. Lobes of tenth segment deep in side view . . . . . . **ulmeri** sp. n.
– Apex of aedeagus, in side view, produced but not strongly clavate, parameres gently curved. Lobes of tenth segment narrow in side view . . . . **scottae** sp. n.

Amphipsyche senegalensis (Brauer)

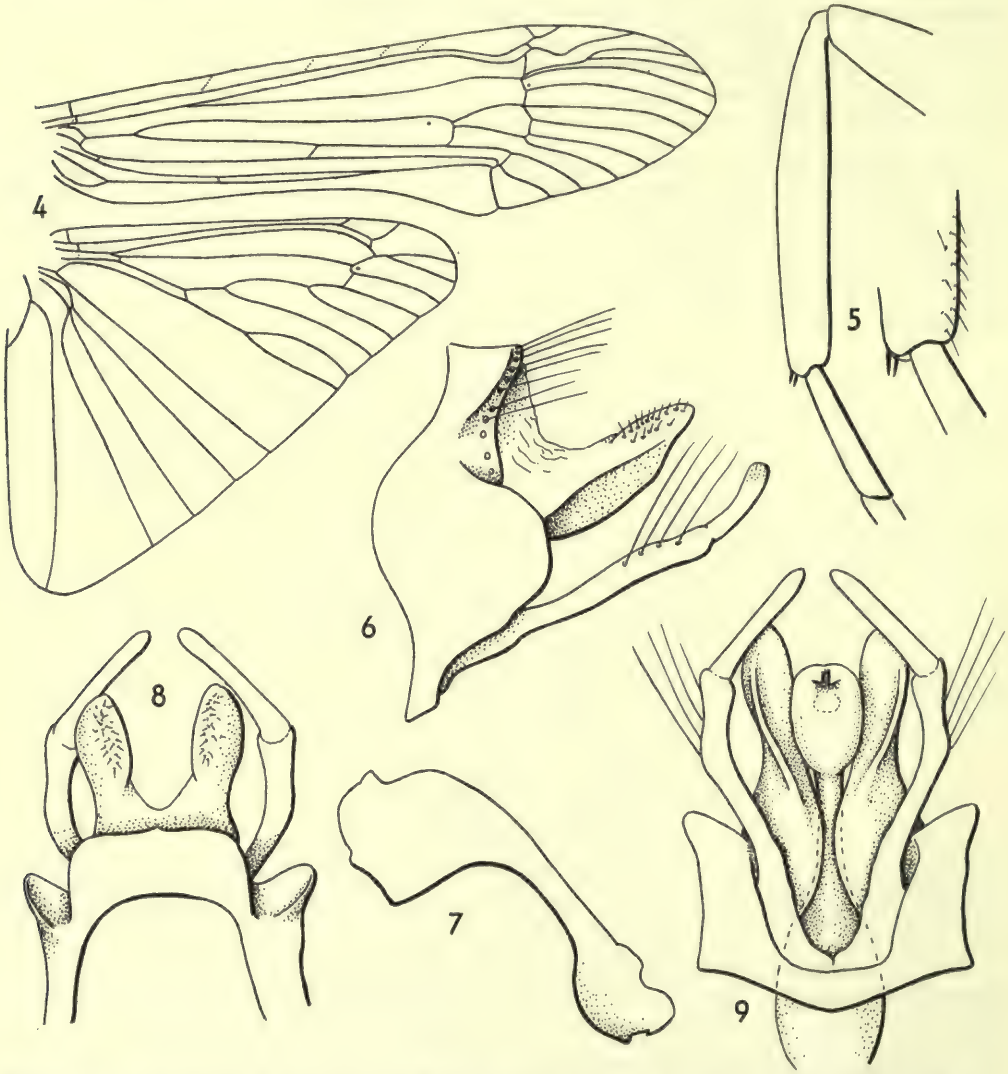
(Text-figs. 4–13)

Phanostoma senegalense Brauer, 1875 : 71, pl. 4, figs. 5–5*c* (Senegal) ; Ulmer, 1907 : 26, fig. 12 (Congo) ; *id.*, 1907*a* : 32–33, fig. 24 ; *id.*, 1907*b* : 159, pl. 21, fig. 198 ; Mosely, 1932 : 5, pl. 1, fig. 6 (Mozambique) ; Barnard, 1934 : 369.

Brauer's description is based upon males only and the account of the general appearance is good. His figure of the wing venation is also reasonably good, but he shows the veins R_{2+3} and R_4 in the fore wing as fused near their bases, whereas (as Ulmer has pointed out) they are separate but close together. Cell R_{2+3} in hind wing may be either just sessile or with a short footstalk. His description and figures of the male genitalia, being made from the dried material, are rather inadequate by modern standards and I am therefore giving a new description and figures.

Designation of Lectotype

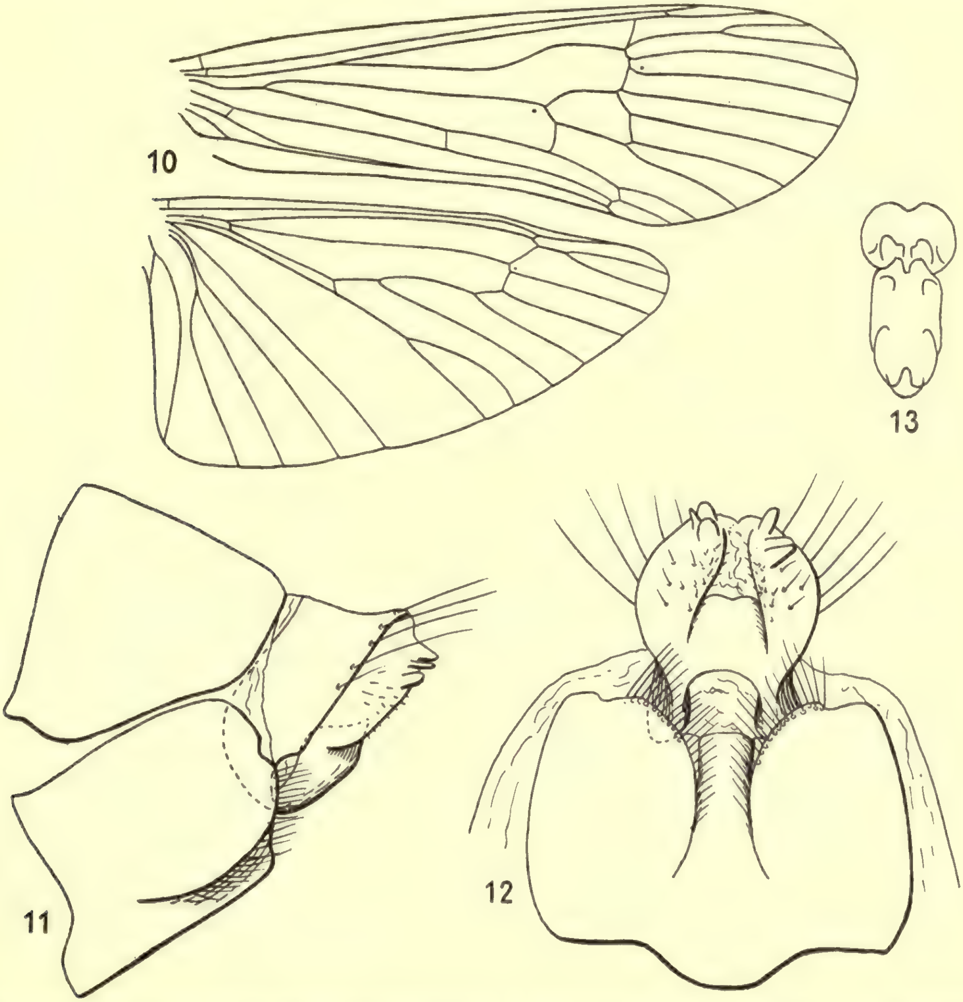
No lectotype has been selected from Brauer's type series, so I take this opportunity of designating the example with the following labels : " Steindachner, 1869, *Senegal* "; " *senegalense* det. Brauer "; " *senegalense* det. Ulmer "; " *Phanostoma senegalense Brauer*, ♂, Lectotype, D. E. Kimmins det. 1960 " (Vienna Museum). The lectotype has one pair of wings mounted between sheets of celluloid, the abdomen and one fore leg cleared in KOH solution and preserved in a small vial of glycerine, both prepara-



Figs. 4–9. *Amphipsyche senegalensis* (Brauer), ♂ Lectotype. 4, wings ; 5, fore tibia, with apex more enlarged ; 6, genitalia, lateral ; 7, aedeagus, lateral ; 8, genitalia, dorsal ; 9, ventral and from behind.

tions being attached to the staging pin. There are also four other males from the type-series.

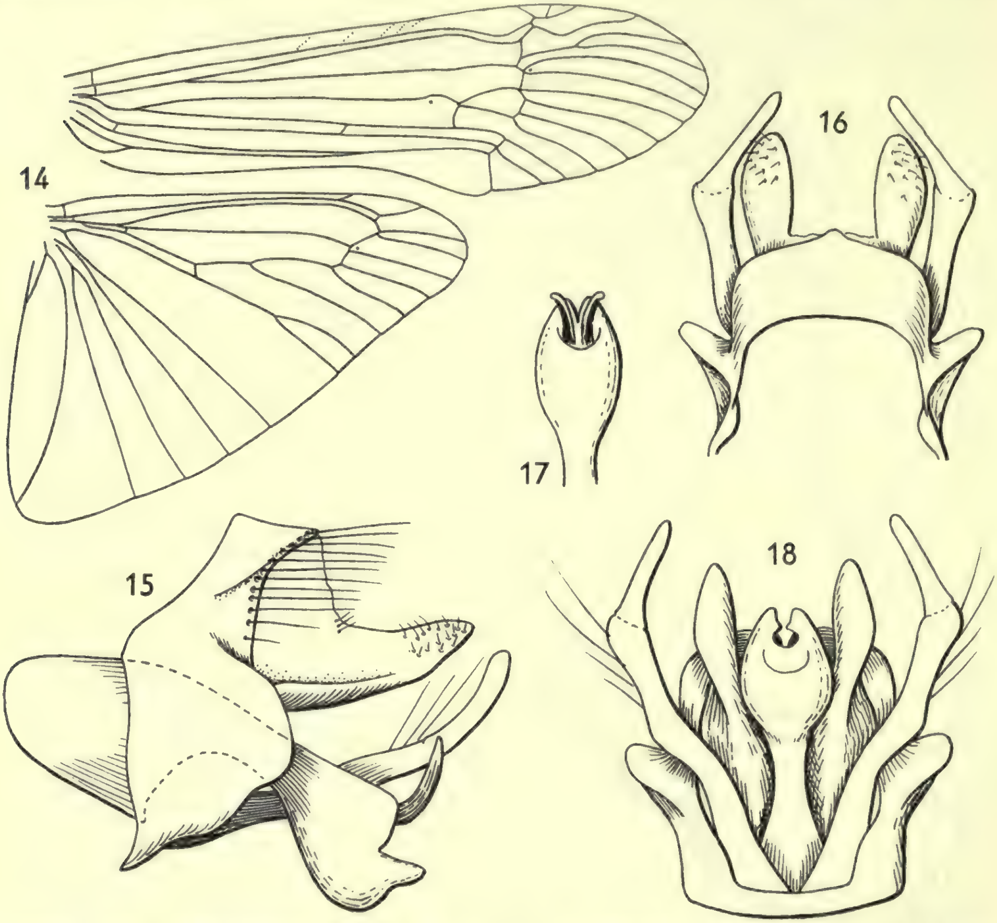
♂ GENITALIA of lectotype. Ninth segment with the dorsal apical margin only slightly produced at its centre. Side-pieces large and rounded. Tenth segment deeply excised at its centre to form a pair of narrow ovate lobes, set well below the level of the ninth tergite and linked to the latter by membrane. The upper surface of the lobes bears a number of small setae. Lower margins of the tenth segment partly enfold the stem of the aedeagus. The latter organ has a wide base, constricting to a slender stem and then dilating to form a clavate apex. The apical surface of aedeagus bears two small triangular teeth or lobes (shown in Brauer's fig. 5*e*). There are no



FIGS. 10–13. *Amphipsyche senegalensis* (Brauer), ♀ (Lualaba River). 10, wings; 11, genitalia, lateral; 12, ventral; 13, bursa copulatrix, ventral, more enlarged.

spiniform parameres. Claspers long, slender and sinuous, the articulation between the basal and terminal segments somewhat indefinite.

♀ GENITALIA (Congo, Lualaba River). Pleurosternum of eighth segment large, plate-like, its convex lower margin almost meeting that of the opposite side ventrally. Posterior margin slightly excised. Eighth sternite reduced to a narrow, lightly sclerotized tongue, not extending as far as apices of the pleurosterna. Ninth tergite forming a hood, clasper groove obscure. Ninth sternite narrow, apex slightly excised. Tenth segment with the usual three pairs of processes.



FIGS. 14–18. *Amphipsyche ulmeri* sp. n. ♂. 14, wings; 15, genitalia, lateral; 16, dorsal; 17, apex of aedeagus, dorsal; 18, genitalia, ventral and behind.

Length of fore wing, ♂, 13–15 mm.; ♀, 9–10 mm.

I have seen no females from the type-locality, Senegal. I have therefore endeavoured to fix the female of *senegalensis* by examination of females taken at the same time and place as males of *senegalensis*. Examination of females fulfilling these conditions from the Congo (Lualaba R.) and Lake Nyasa suggests that the female venation differs appreciably from that of the male. In the fore wing, veins R_{2+3} and R_4 are not closely approximated and *Rs* is more or less strongly sinuous, much more so than in the male. Examples from Lake Victoria also show this sinuosity of *Rs* in the fore wing, and in this locality the males would appear to be extremely rare, since I have seen only one example, although Dr. Corbet and Dr. Hickin have sent me several hundred females. The fact that females with a sinuous *Rs* in the fore wing appear to be associated with male *senegalensis* suggests that *Phanostoma curvinerve* Navás, based upon females from Egypt, may be a synonym of *senegalensis*. This sinuosity of *Rs* in the fore wing does not appear to be a constant generic character in *Amphipsyche* since, in the females of *A. scottae* sp. n. from S. Africa, *Rs* is almost straight.

DISTRIBUTION. I have seen males from SENEGAL, CONGO, S. RHODESIA, NYASALAND and UGANDA.

Amphipsyche ulmeri sp. n.

(Text-figs. 14–18)

Phanostoma senegalense Brauer ; Ulmer, 1923 : 19 (*partim*, Sennar) ; *id.*, 1924 : 2 (Sennar).

EGYPTIAN SUDAN : Sennar, 18–27.ii.1914, *Ebner*, 7 ♂, two labelled "*Phanostoma senegalense Brau.*" in Ulmer's writing.

♂ HOLOTYPE (pinned). General colour pale tawny, antenna finely annulated with reddish. Thorax clothed with short, pale pubescence. Fore wing very pale tawny, with slightly darker clouding over the anastomosis. *Rs* almost straight, R_{2+3} separated from R_4 at their bases by about the distance between R_4 and R_5. In the hind wing, cell R_{2+3} is sessile.

♂ GENITALIA following the general pattern of the genus. Aedeagus with two curved spine-like parameres, angled abruptly upwards. Stem of aedeagus less slender than in *senegalensis*, apex clavate, its lower margin projecting in two rounded, triangular lobes.

Length of fore wing, 13–14 mm.

♂ HOLOTYPE (pinned, with wings between celluloid and abdomen in a small vial of glycerine) and paratypes in the Naturhistorisches Museum, Vienna. In the course of correspondence with Dr. Ulmer in 1956 concerning *Phanostoma*, he informed me that he had in his collection two females from Sennar and that they had *Rs* in the fore wing curved but less so than in Egyptian examples which he had identified as *P. curvinerve* Navás. This fact may be additional evidence in favour of *A. ulmeri* being distinct from *A. curvinervis*.

Amphipsyche corbeti sp. n.

(Text-figs. 19–23)

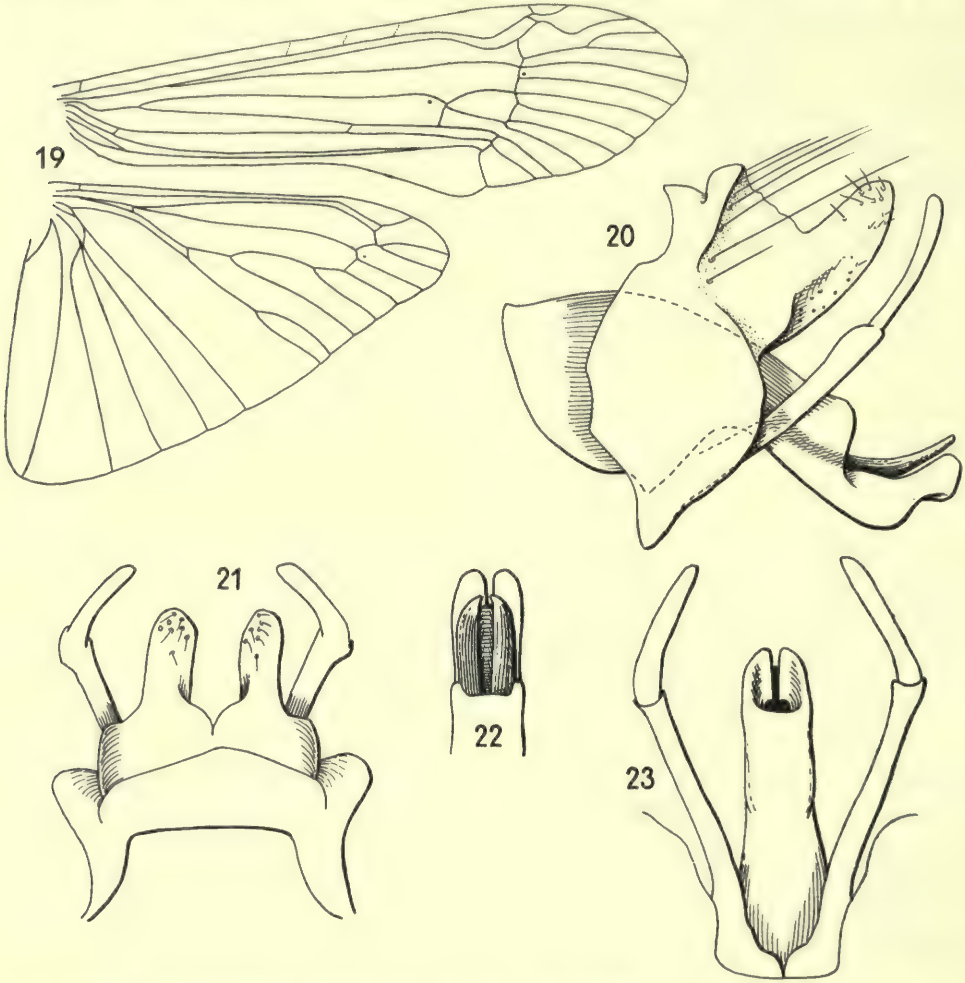
UGANDA : Northern Province, Victoria Nile, Karuma Falls, *P. S. Corbet*, numerous males.

♂ HOLOTYPE (in alcohol). General colour very pale tawny. Antenna finely annulated with fuscous. Anterior femur with a longitudinal fuscous streak on ventral surface. Mesonotum rather darker tawny. Abdominal segments whitish, faintly marked with very pale purplish transverse bands on the tergites and with a similarly coloured median ventral streak. In fore wing, R_{2+3} widely separated from R_4 basally.

♂ GENITALIA. Ninth segment with its dorsal apical margin only slightly produced. Side-pieces rounded. Lobes of the tenth segment broad basally, the apical portion about half as wide as the basal, which projects laterally as a shoulder. In dorsal view, the lobes are parallel, with rounded apices. Aedeagus with a stout stem, in side view somewhat constricted about mid-way, lower apical margin produced in a pair of lobes. In ventral view, the inner margins of the lobes are parallel, their basal angles hooked. Above these lobes are a pair of stout, spiniform parameres, curving upwards in side view. Claspers slender, indistinctly two-segmented.

♀ unknown.

Length of fore wing, 11 mm.



FIGS. 19–23. *Amphipsyche corbeti* sp. n. ♂. 19, wings; 20, genitalia, lateral; 21, dorsal; 22, apex of aedeagus, dorsal; 23, genitalia, ventral and behind.

♂ HOLOTYPE (now mounted as microscope preparations), paratypes in 2% formaldehyde solution, in British Museum (Nat. Hist.). This species differs from *A. ulmeri* in the less constricted stem of the aedeagus, whose apex is more produced, and in the stouter parameres. The tenth segment is wider at the base in dorsal view, with definite shoulders.

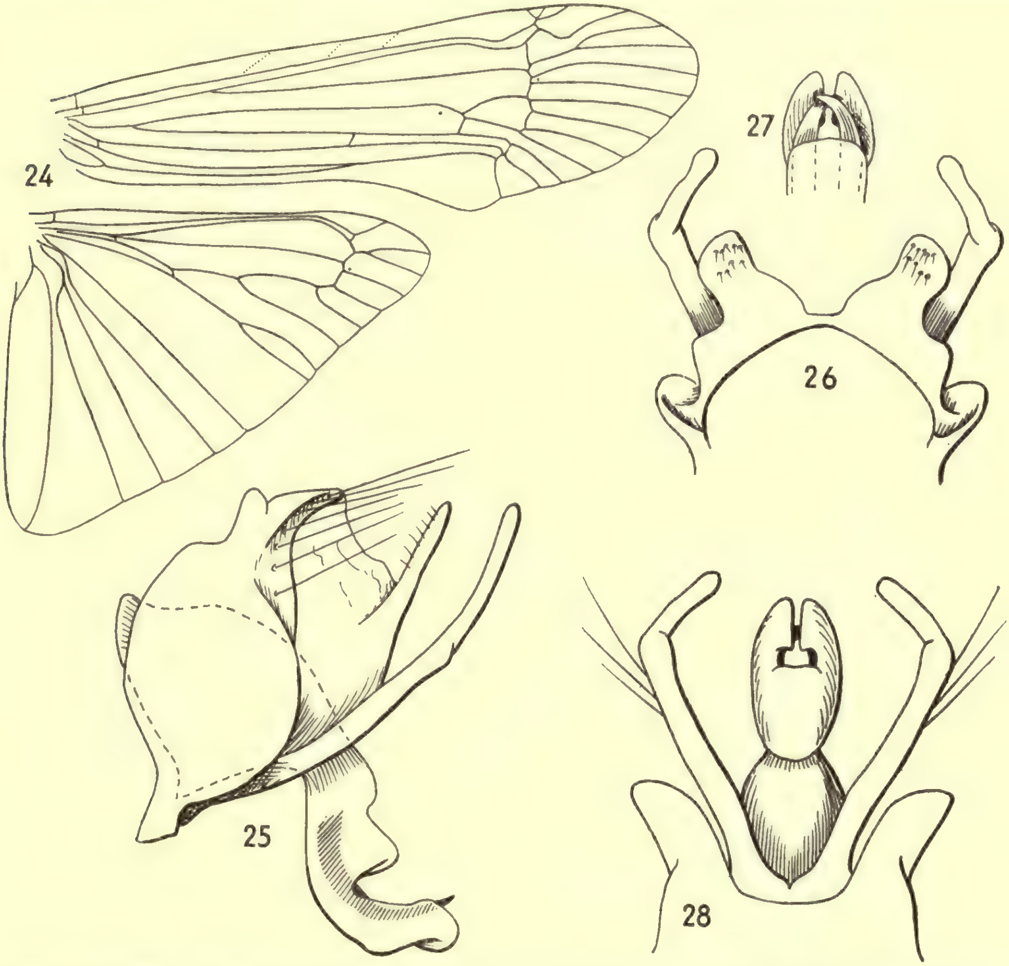
Amphipsyche berneri sp. n.

(Text-figs. 24–28)

Phanostoma senegalense Brauer : Kimmins, 1957 : 13 (Gold Coast examples).

GOLD COAST : Volta River, Senchi, 1.viii.1950, *Lewis Berner*, 4 ♂.

♂ HOLOTYPE. Specimen originally preserved in alcohol, general colour tawny yellow, antenna with fine fuscous annulations, abdomen with faint purplish markings. Fore wing yellowish



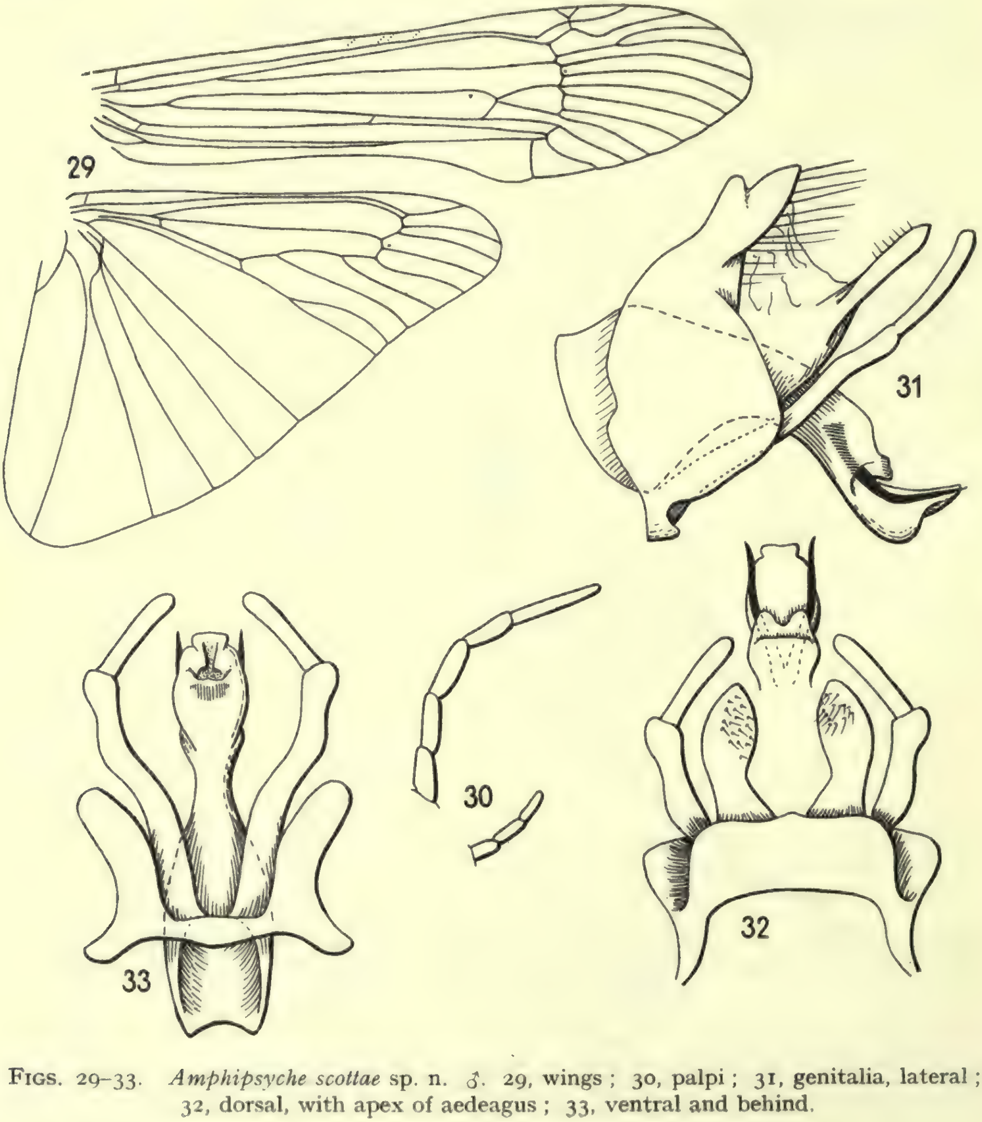
FIGS. 24–28. *Amphipsyche berneri* sp. n. ♂. 24, wings ; 25, genitalia, lateral ; 26, dorsal ; 27, apex of aedeagus, dorsal ; 28, genitalia, ventral and behind.

brown, with darker shading behind the sinuously curved portions of *Sc* and R_1. Cell R_{2+3} at base at least as wide as cell R_4. *Rs* straight.

♂ GENITALIA resembling *A. corbeti* in general pattern. Tenth segment also shouldered at its base, but in the type the lobes of the tenth tergite are strongly divergent in dorsal view and in side view appear as narrow plates. The aedeagus is similar but, in side view, there two projections on the dorsal margin. In ventral aspect the apex is more clavate.

Length of fore wing, 12 mm.

♂ HOLOTYPE (mounted as microscope preparations) and 1 paratype in 2% formaldehyde solution, in British Museum (Nat. Hist.), 2 ♂ paratypes in University of Florida.

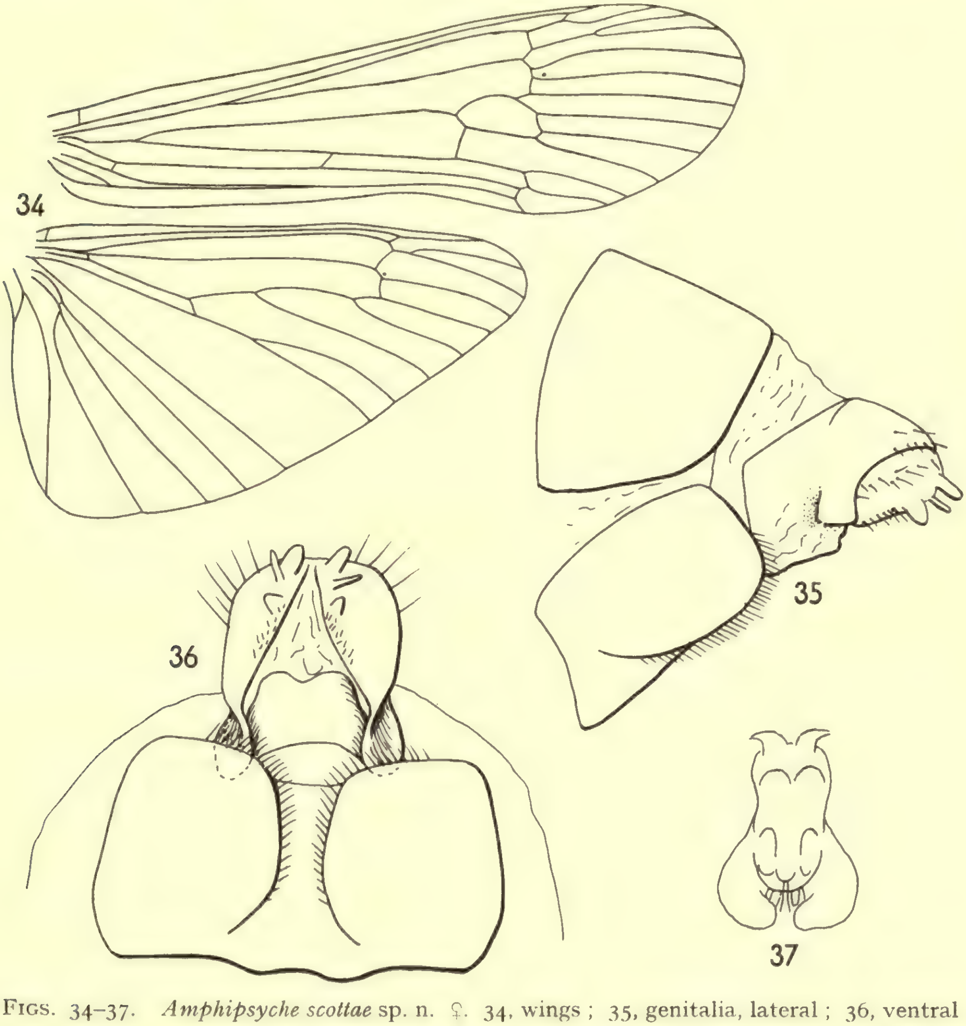


FIGS. 29–33. *Amphipsyche scottae* sp. n. ♂. 29, wings; 30, palpi; 31, genitalia, lateral; 32, dorsal, with apex of aedeagus; 33, ventral and behind.

***Amphipsyche scottae* sp. n.**

(Text-figs. 29–37)

SOUTH AFRICA: Vaal River barrage, 20.iii.1956, 6 ♂, 31.iii.1958, 1 ♂; below Vaal barrage wall, 29.vi.1956, 8 ♂; Vaal River, below barrage, 23.viii.1957, 1 ♀ and pelt; Waterval River, at Joburg-Durban Road, 16.x.1958, 2 ♂; Wilge River at Warden-Reitz Road, 8.xii.1958, 8 ♂; Wilge River at Frankfort, 8.xii.1958, 3 ♂; Waterval River, on National Road between Standerton and Greylingstad, 12.i.1959, 3 ♂; Wilge River, 5 miles below Harrismith, 10.ii.1959, 3 ♂; Wilge River, between Warden and Reitz, 9.ii.1959, 9 ♂. All specimens in alcohol.



FIGS. 34–37. *Amphipsyche scottae* sp. n. ♀. 34, wings; 35, genitalia, lateral; 36, ventral; 37, bursa copulatrix, ventral.

♂ HOLOTYPE. As the specimen was in alcohol, one can only say of its general appearance that it was tawny yellow, antenna finely annulated with reddish at the joints. Abdomen lightly tinged with reddish purple. Fore wing faintly clouded with brownish. *Rs* almost straight, R_{2+3} not closely adjacent to R_4, the space between them not much less than that between R_4 and R_5. In hind wing, cell R_{2+3} generally broadly sessile.

♂ GENITALIA following the general pattern of *A. corbeti* and *A. berneri*. Tenth segment not broadly shouldered at base, the lobes with their inner margins concave in dorsal view and in side view thin as in *berneri*. The aedeagus with a pair of spiniform parameres, projecting from beneath a pair of rounded dorsal lobes. Apical lobe of aedeagus truncate, not divided, its ventral surface bearing a pair of small triangular plates, facing each other.

♀ ALLOTYPE. This specimen was bred and is rather teneral. Colours much as in male. In the fore wing, *Rs* runs almost straight to the anastomosis, not sinuous as in *senegalensis*. Apical cellules narrower than in *senegalensis*.

♀ GENITALIA. Pleurosternum of eighth segment large, plate-like, its curved lower margins almost meeting over the eighth sternite. The latter is lightly sclerotized and does not extend beyond the pleurosternum. Ninth tergite forming a hood, clasper groove shallow. Ninth sternite in the shape of a transverse plate, whose apical margin is shallowly excised at the centre. Tenth segment with the usual three pairs of processes.

Length of fore wing, ♂, 18 mm.; ♀, 14 mm.

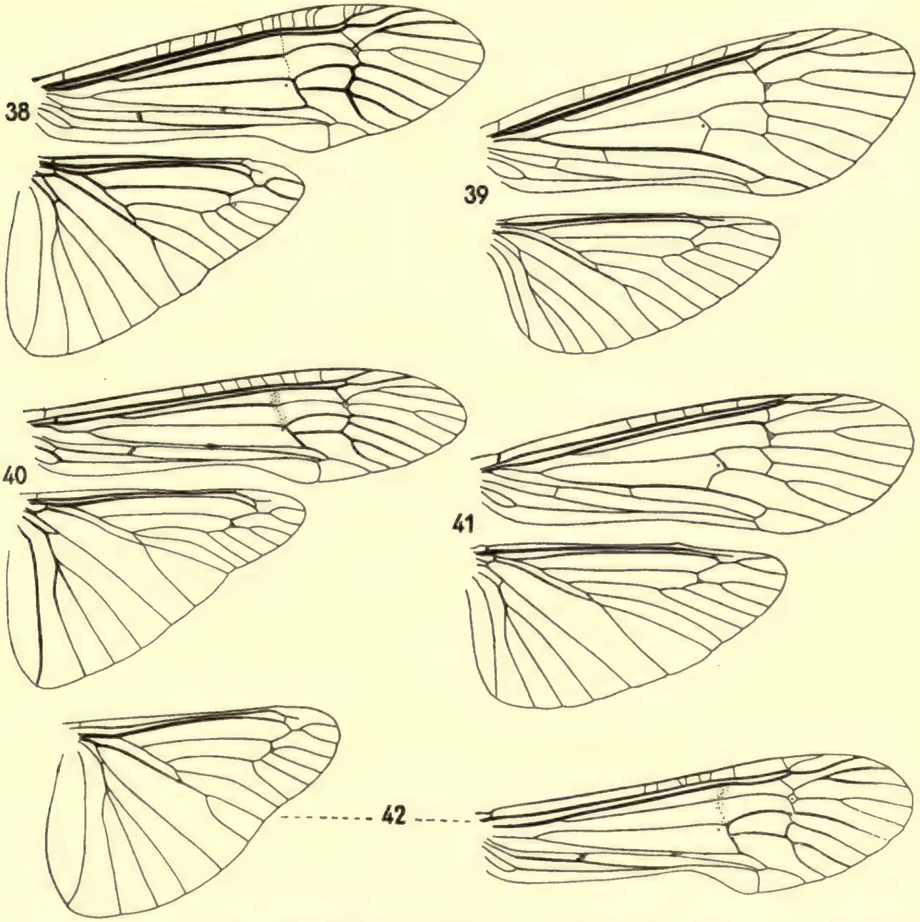
♂ HOLOTYPE (Wilge R., 5 miles below Harrismith, 10.ii.1959), ♀ ALLOTYPE (Vaal River, below barrage, 23.viii.1957), both mounted as microscope preparations in British Museum (Nat. Hist.); paratypes in South African Museum and British Museum (Nat. Hist.). This species is related to *A. corbeti* and *A. berneri* but may be separated by the form of the tenth tergite and of the aedeagus. This species is named after Dr. Marjorie Scott, of the University of Cape Town.

THE GENERA *AETHALOPTERA* AND *CHLOROPSYCHE*

(Text-figs. 38-47)

The genus *Aethaloptera* was described by Brauer (1875 : 71), with *A. dispar* Brauer (W. Africa) as the only included species. McLachlan (1880, *Suppl.* **2** : lxix–lxx) described the genus *Chloropsyche*, with type species *evanescens* McL. (Amurland), and among the characters given to separate it from *Aethaloptera* Brauer are the spur formula 0.2.2 (*Aethaloptera* 0.3.2), and the male intermediate tibiae slender, with the tarsi slightly flattened, fringed but not dilated. McLachlan's figure of the male wings shows that in the hind wing, fork R_4 is sessile as in *Aethaloptera*. Ulmer (1906 : 62) described *Aethaloptera maxima* from S. Africa, which had a spur formula of 0.2.2, and fork R_4 in the hind wing stalked. This species was transferred by Ulmer, (1907*a* : 17) to *Chloropsyche* McLachlan, with which it agreed in spur formula but not in the shape of fork R_4 in the hind wing. As a result, *Chloropsyche* then differed from *Aethaloptera* only in possessing two instead of three spurs on the intermediate tibiae, the latter being not or less dilated than in *Aethaloptera*.

As the male genitalia of *Chloropsyche maxima* appeared to be almost identical with those of *A. dispar*, it was decided to investigate more thoroughly the type-specimen of *Chloropsyche evanescens* McL. It was at once obvious that McLachlan's statement (1880 : lxix) " All the legs are slender in the male " was not strictly accurate. The intermediate tibiae and tarsi are slightly but definitely dilated, the latter being nearly twice as wide as the posterior tarsi. The intermediate tibiae also showed a slight swelling just beyond the base and in this area (in the pinned specimen) near the anterior margin there appeared to be a minute pit. Examination of the cleared intermediate tibiae of a second specimen under a compound microscope suggested that this pit was the rudimentary socket of the third or pre-apical spur. No actual spur was seen in the four specimens studied and it would seem that the pre-apical spur of the intermediate tibia is either very easily detached or obsolete in *evanescens*. Specimens of *C. maxima* have the intermediate tibiae and tarsi about as much dilated as in *evanescens*, but microscopic examination reveals neither a swelling just beyond the base nor any evidence of a spur socket. Other cases are known in which the tibial spur formula has proved variable and unreliable as a generic character and the genus *Chloropsyche* does not appear to me to be worthy of separation from *Aethaloptera*



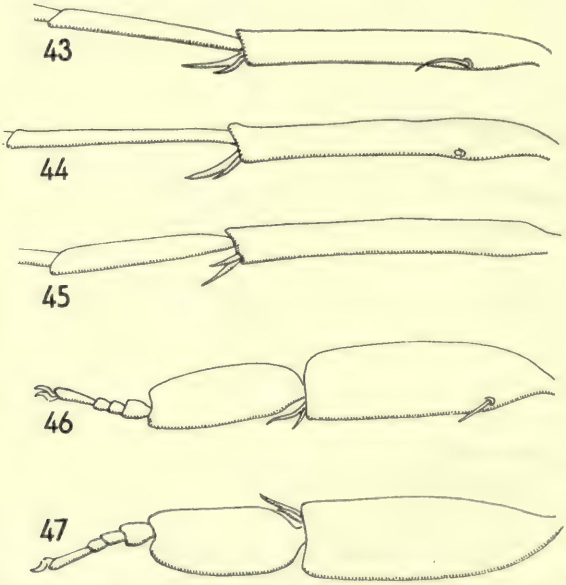
FIGS. 38–42. Wings of *Aethaloptera* spp. 38, *A. dispar* Brauer, ♂ (Uganda) ; 39 *A. dispar*, ♀ (Sierra Leone) ; 40, *A. maxima* Ulmer, ♂ (S. Africa) ; 41, A. *maxima*, ♀ (SW. Africa) ; 42, *A. evanescens* McLachlan, ♂ (Amur).

and I place it in the synonymy of that genus. *Paraethaloptera* Martynov (1935 : 193), type species *P. gracilis* Mart., 1935, also seems doubtfully distinct from *Aethaloptera*. The type of *Paraethaloptera punctata* Banks has a spur formula of 0.3.2, and should be transferred to *Aethaloptera*.

AETHALOPTERA Brauer

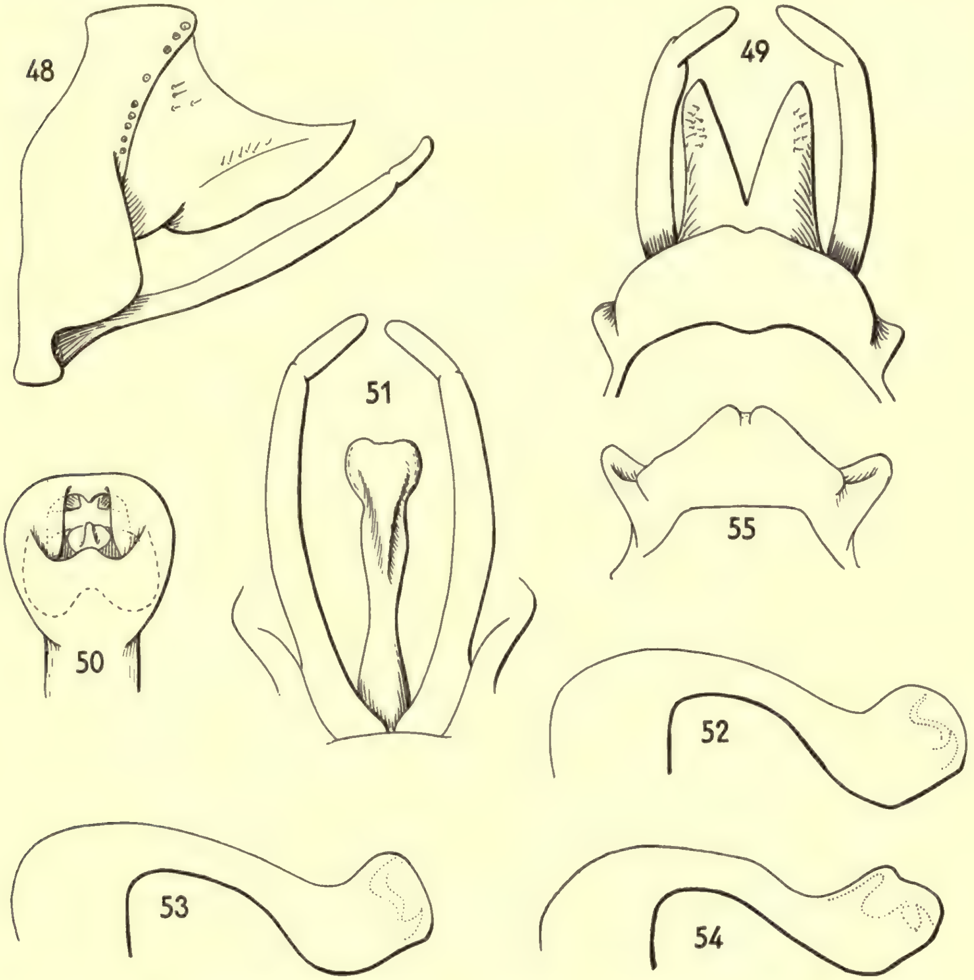
1875 : 71. Type-species, *A. dispar* Brauer, 1875.
Chloropsyche McLachlan, 1880 : lxix (**syn. nov.**).
  Type species, *C. evanescens* McL., 1880.
? *Paraethaloptera* Martynov, 1935 : 193.
  Type species, *P. gracilis* Mart., 1935.

Four species of this genus have been recorded from Africa, *A. dispar* Brauer, *A. maxima* Ulmer, *A. maesi* (Navás) and *A. marcina* (Navás), the two latter species being considered as synonyms of *A. dispar*. Whilst *A. dispar* and *A. maxima* can generally be separated on the spur formula of the intermediate tibiae and on the stalked or sessile condition of fork R_4 in the hind wing, both Ulmer and Barnard have commented on the fact that the male genitalia are apparently identical. I have examined numerous specimens and a number of cleared preparations of both species and find that the genitalia, though similar, are not uniform in details, but the variations do not appear to be correlated with any particular spur formula or arrangement of wing venation. The females similarly do not show any constant differences



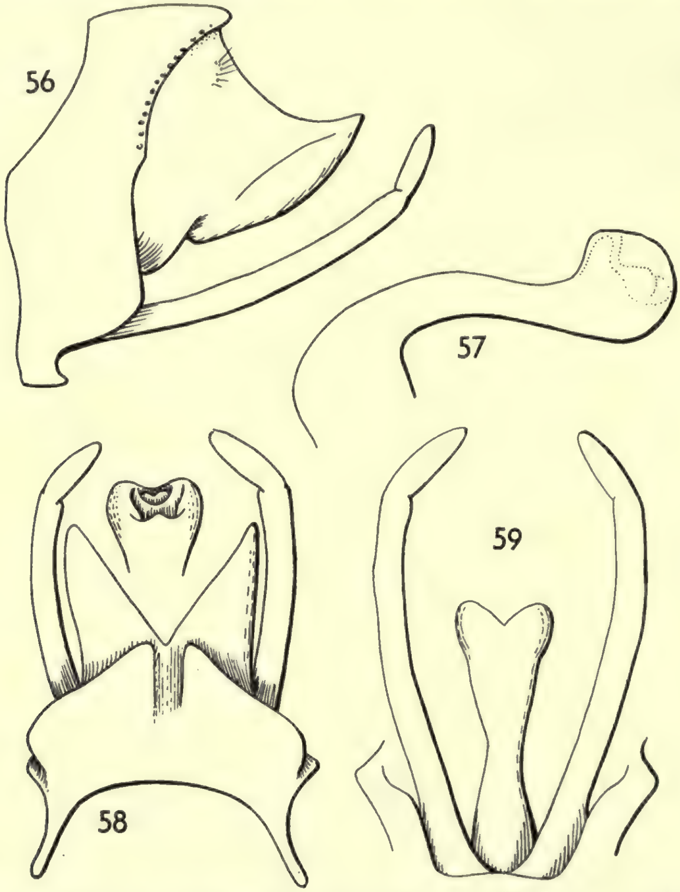
FIGS. 43–47. Median tibiae, etc., of *Aethaloptera* spp. 43, *A. dispar* Brauer, ♂ (Gold Coast) ; 44, *A. evanescens* McL., ♂ (Amur) ; 45, *A. maxima* Ulmer, ♂ (Port. E. Africa) ; 46, *A. dispar*, ♀, (Sierra Leone) ; 47, *A. maxima*, ♀, (SW. Africa).

in genitalia which might be considered as specific. The venation of the hind wing in the females also shows some variation, specimens with three tibial spurs sometimes having a short footstalk to fork R_4 instead of having it sessile. Such variation is not surprising when one considers that the stalked state of fork R_4 in this genus is a secondary condition. R_4 and R_5 separate at the anastomosis, rapidly running together again, forming a small cell enclosing the corneous point, subsequently separating again to form fork R_4. Fork M_3 in the fore wing of the female may be either sessile or stalked in *dispar* and usually stalked in *maxima*.



FIGS. 48–55. *Aethaloptera dispar* Brauer, ♂ genitalia. 48, lateral ; 49, dorsal ; 50, apex of aedeagus, dorsal, more enlarged ; 51, claspers and aedeagus, ventral ; 52, aedeagus, lateral (Gold Coast) ; 53, the same (Sierra Leone) ; 54, the same (Nyasaland) ; 55, ninth segment, dorsal (Nyasaland).

These two species in Africa possibly represent local forms of one widespread species, *maxima* being centred in S. Africa and spreading northwards into N. Rhodesia and Portuguese East Africa. *A. dispar* has its centre in equatorial Africa, extending from west to east and northwards into the Sudan. In Nyasaland one gets a form which is intermediate, the venation and spur formula being that of *dispar* and the male genitalia tending towards that of *maxima*. Ulmer's record of *dispar* from Livingstone, N. Rhodesia suggests that the range of both species overlaps in Northern Rhodesia. For the present, however, it is proposed to treat the two as closely allied species.



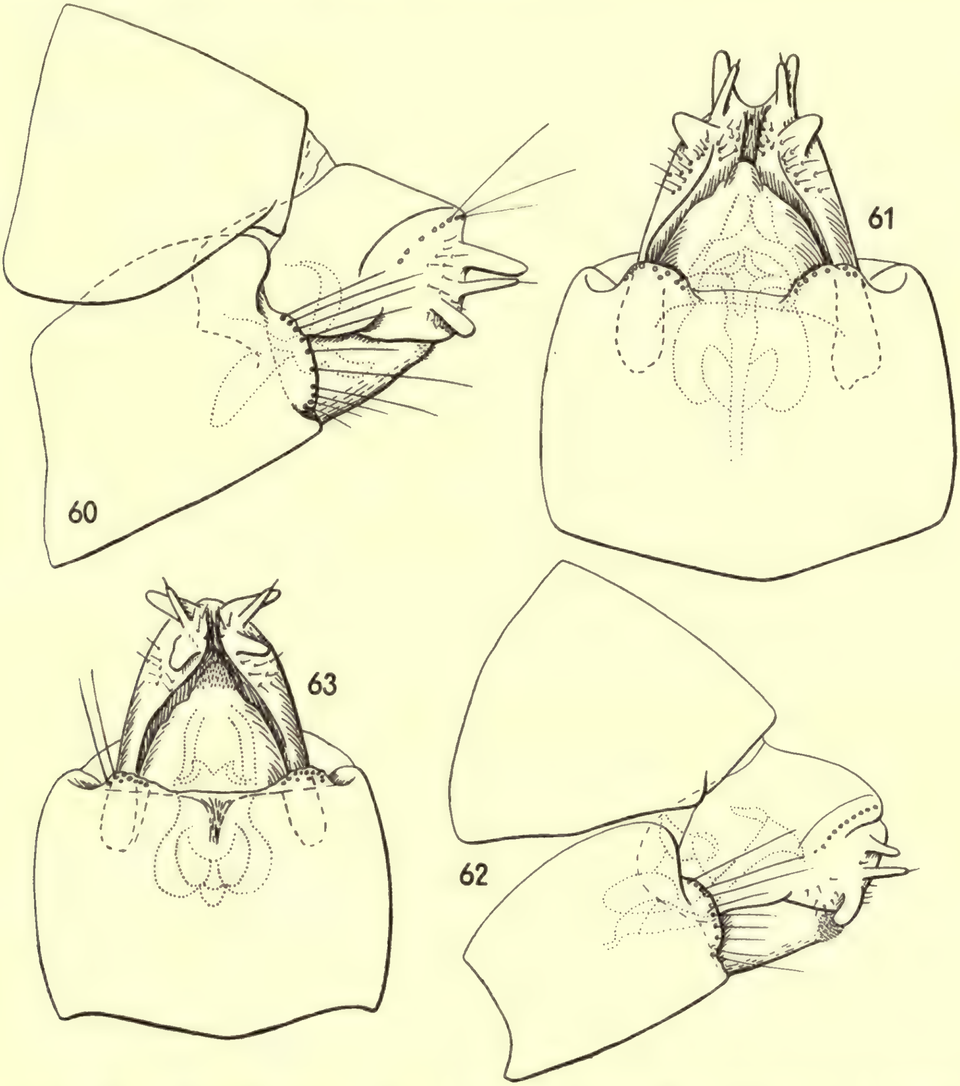
FIGS. 56–59. *Aethaloptera maxima* Ulmer, ♂ genitalia. 56, lateral; 57, aedeagus, lateral; 58, genitalia, dorsal; 59, claspers and aedeagus, ventral.

Aethaloptera dispar Brauer

(Text-figs. 38, 39, 43, 46, 48–55, 60–61)

1875 : 72, pl. 4, figs. 4–4*c*.
Primerenca maesi Navás, 1914 : 182.
Primerenca marcina Navás, 1916 : 26.

From records and specimens the distribution appears to be SENEGAL, SIERRA LEONE, GOLD COAST, S. NIGERIA, BELGIAN CONGO, S. SUDAN, UGANDA, TANGANYIKA, NORTHERN RHODESIA (Livingstone) and NYASALAND.



FIGS. 60–63. Female genitalia of, 60–61, *A. dispar* Brauer (Uganda), and 62–63, *A. maxima* Ulmer (S. Africa). 60, lateral; 61, ventral; 62, lateral; 63, ventral.

Figures are given of the ♂ genitalia of an example from Gold Coast, and comparative figures of the aedeagus in side view of specimens from Sierra Leone and Nyasaland. It will be seen that the shape of the apex is by no means uniform and that there is variation in the contour of the lower margin of the stem. The lower surface towards the apex is often more keeled than in *maxima*. The apical margin of the ninth segment varies in the amount of its production but is generally without a median dorsal furrow. The degree to which the lobes of the tenth segment diverge is not constant.

In the female, the produced setose lobes on the apical margin of the eighth sternite are variable in shape. The apex of the ninth sternite is only very sparsely setose. Bursa copulatrix rather complex in structure but possibly variable.

Length of fore wing, ♂, 10–16 mm.; ♀, 7–10 mm.

The female specimens recorded doubtfully by Ulmer (1912 : 95) as *Aethaloptera sexpunctata* Kolenati from Kamerun may possibly belong here. Since he recorded them as *Aethaloptera*, one presumes that they had the typical spur formula 0.3.2. On the other hand, fork R_4 in the hind wing is stalked, which suggests that they might be *A. maxima*, which would be a rather unusual distribution for that species as we know it at present.

Aethaloptera maxima Ulmer

(Text-figs. 40, 41, 45, 47, 56–59, 62, 63)

1906 : 62, fig. 66.
Chloropsyche maxima (Ulmer), 1907 : 17, fig. 2.

Records and specimens give the distribution as follows : S. AFRICA, SW. AFRICA, PORTUGUESE E. AFRICA, NE. RHODESIA.

In the male genitalia, the apical margin of the ninth segment is generally more produced and there is often a longitudinal dorsal furrow. The apex of the aedeagus is rather more rounded in side view than in *dispar*. In the female, the genitalia are much as in *dispar* but the apex of the ninth sternite is densely setose.

Length of fore wing, ♂, 14–18 mm.; ♀ 9–13 mm.

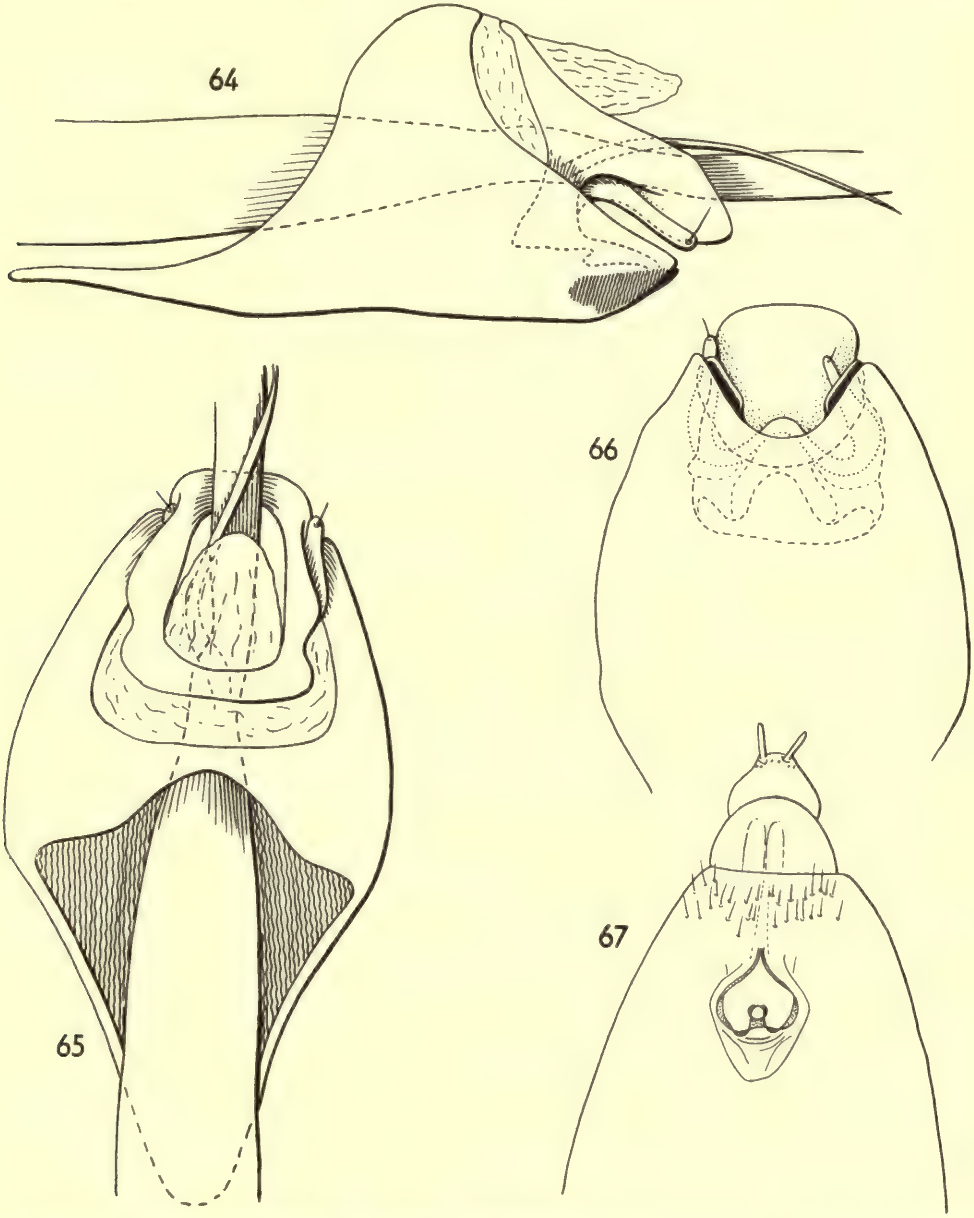
Family **HYDROPTILIDAE**

Oxyethira velocipes (Barnard)

(Text-figs. 64–67)

After examination of a paratype male and other material of this species, I agree with the suggestions of Drs. Ross and Ulmer that *Argyrobothrus* is not generically distinct from *Oxyethira*. It has the same spur formula and the arrangement of the warts on the mesoscutellum and the shape of the metascutellum agree. There is a slender spine at the apex of the seventh sternite. The male genitalia of this species are not easy to interpret and are rather more complex than Barnard's figures suggest (1934 : 392). I am therefore refiguring them on a larger scale from a paratype and giving a new description of them.

♂ GENITALIA. Eighth segment synscleritous, almost completely encasing the ninth segment, from the side obliquely truncate, and from beneath with its apex excavate. Ninth segment about as long ventrally as eighth, but dorsally narrowed to a transverse band. Apex of ninth segment also excavate ventrally. Aedeagus long, slender, with a spiral spine somewhat beyond mid-way, and another curved spine shortly before the apex. Claspers reduced to two short, wide lobes, projecting a little beyond the margin of the ninth segment in the excavation. Basally they are linked to a structure, possibly the basal plate, which takes the form of a quadrate plate beneath the aedeagus. Its upper margins extend dorsally at the base and completely encircle the aedeagus, this upper part being joined by membrane to the ninth segment. On each side of the basal plate is a digitate, transparent process, terminating in a seta. Above the aedeagus is a membranous lobe (? tenth segment). The basal plate is the structure referred to by Barnard as the tenth segment.



FIGS. 64–67. *Oxyethira velocipes* (Barnard), genitalia. 64, ♂, lateral; 65, ♂, dorsal; 66, ♂, ventral; 67, ♀, ventral.

Family **LEPTOCERIDAE**

Subfamily **LEPTOCERINAE**

Whilst Kimmins' (1956) paper on the African Leptocerinae was in the press, Marlier (1955 : 150) added one new genus, *Limnoecetis*, and I therefore take this opportunity of revising my key to the African genera.

1	Fork Cu_{1a} in hind wing present	4
–	Fork Cu_{1a} in hind wing absent	2
2	Wings reduced, very narrow, no apical forks in hind wing	***LIMNOECETIS****
–	Wings not reduced, hind wing with at least fork R_2	3
3	In fore wing, stem of M (usually) obsolete, thus thyridial cell is absent ; if stem of M is present, then stem of epicranial suture is absent	***TRIAENODES***
–	In fore wing, stem of M present, complete, thyridial cell present ; stem of epicranial suture present	***ADICELLA***
4	Fore wing with forks R_2, M_1 and Cu_{1a} present	5
–	Fore wing with forks R_2 and Cu_{1a} only	7
5	In fore wing, cell R_5 with a footstalk	6
–	In fore wing, cell R_5 sessile	***LEPTOCERINA*** ♀
6	In hind wing, Rs is more or less parallel to R_1	***ATHRIPSODES*** ♀
–	In hind wing, Rs diverges from R_1, R_{2+3} arching towards R_1	***PSEUDOLEPTOCERUS*** ♀
7	Rs in hind wing completely or partially obsolete	8
–	Rs in hind wing not obsolete	12
8	In hind wing, M also obsolete at base	***LEPTOCELLA***
–	In hind wing, M not obsolete at base	9
9	Spurs 1.2.2, that of anterior tibia small ; fork R_2 in hind wing present or absent	***SETODES*** (*partim*)
–	Spurs 0.2.2 ; fork R_2 in hind wing present	10
10	Hind wing moderately broad (about 2½–3 times as long as broad), posterior margin moderately convex	***HEMILEPTOCERUS***
—	Hind wing narrow (about 4–5 times as long as broad), posterior margin only slightly convex	11
11	Basal segment of antenna (in both sexes) rather short, stout, tapering to apex and without a tuft of long hairs at apex in male	***SETODES*** (*partim*)
—	Basal segment of antenna (in both sexes) slender, cylindrical, in male with a tuft of long hairs at apex	***TRICHOSETODES***
12	M in hind wing unforked	13
—	M in hind wing forked	14
13	Spurs 1.2.2, fork R_2 in hind wing present	***PARASETODES***
—	Spurs 2.2.2, fork R_2 in hind wing absent	***PTOCHOECETIS***
14	In fore wing, M_{3+4} clearly arises from M	15
—	In fore wing, M_{3+4} arises from *m–cu* cross-vein or from Cu_{1a}	***OECETIS*** (=***SETODELLINA***)
15	In fore wing, M_{3+4} arises at or before anastomosis	16
—	In fore wing, M_{3+4} arises beyond anastomosis	17
16	Spurs 0.2.2	***LEPTOCERUS***
—	Spurs 2.2.2	***LEPTOCERINA*** ♂
17	In hind wing, Rs diverges from R_2 to enclose a wide radial area	***PSEUDOLEPTOCERUS*** ♂
—	In hind wing, Rs runs more or less parallel to R_1	18

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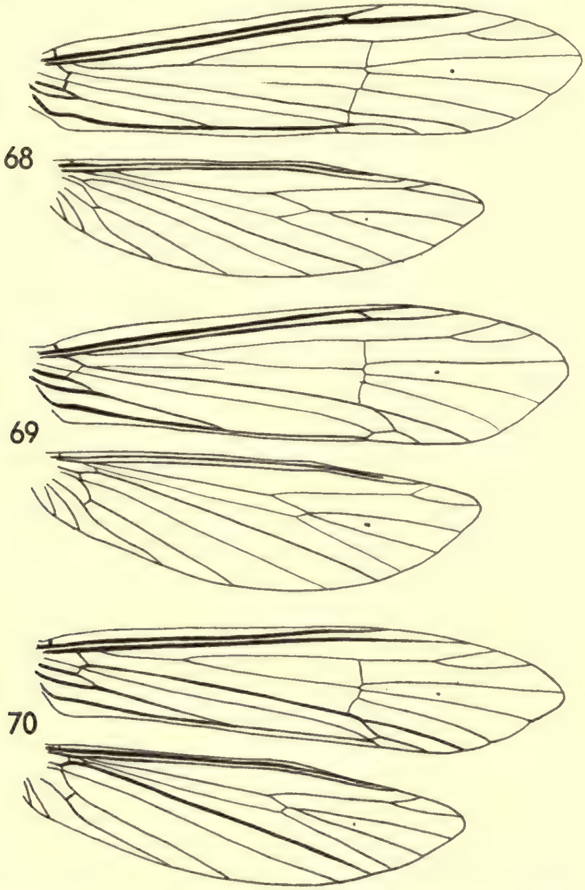
* In October, 1961, after this paper had gone to press, Marlier ((*Inst. R. Sci. nat. Belg., Bull.* **38** (28) : 1–6) transferred his genus *Limnoecetis* to the family Polycentropodidae, Dipseudopsinae. Couplet 2 in the key should therefore be deleted.

18	In fore wing, venation differing in the sexes, fork M_1 present in the ♀	***ATHRIPSODES***
—	In fore wing, venation alike in both sexes	19
19	Fork R_2 present in hind wing	***HOMILIA***
—	Fork R_2 absent in hind wing	***LEPTECHO***

THE GENUS ***TRIAENODES*** McLACHLAN

The majority of the species of this genus are easily recognized by the absence of the stem of the media in the fore wing and this has been used as the main recognition character for the genus. Barnard (1934 : 357) described as *Adicella sicula* a species which had venation typical of *Adicella*, that is, it had the media normally formed and complete, but he commented on the remarkable similarity of the genital structure of the male with that of *Triaenodes serrata* Ulmer. Mosely (1936 : 434) described *Triaenodes darfurica*, which has the male genital structure of the *Triaenodes* pattern ; he figures the venation but strangely enough makes no comment on the fact that



FIGS. 68–70. Wings of *Triaenodes* spp. n. 68, *T. uncata*, ♂; 69, *T. uncata*, ♀; 70, *T. moselyi*, ♂.

the venation is atypical, having the stem of the media complete in the fore wing. Since then, several other species of *Triaenodes* have been described in which the stem of the media in the fore wing shows varying degrees of completeness, the extreme base being most often obsolete. Thus the absence of the stem of the media in the fore wing can no longer be relied upon entirely as a character of the genus *Triaenodes*.

On the other hand, judging by the male genital structures, there does not seem to be any question that *Triaenodes* and *Adicella* are generically distinct. Other possible characters were therefore investigated and it seems that a feature mentioned by Ross (1944 : 212) may be used to supplement the venational character. This is the presence or absence of the stem of the epicranial suture. In *Triaenodes* it is absent in nineteen out of twenty species examined, the exception being the unique type of *Triaenodes chelifera* (Mosely), in which it is present but weakly formed. This species is the type-species of Mosely's genus *Triaenodella*, which was distinguished from *Triaenodes* primarily on the presence in the male of a lobe covering a scent tuft on the basal segment of the antennae. Similar lobes occur in other species of *Triaenodes* which do not have the stem of the epicranial suture developed. In *Adicella* this stem is well developed in six out of eight species examined and in *Erotesis* (closely allied to *Adicella*) it is present in both species examined. The exceptions are *A. triaenodiformis* Ulmer (known only from the female type) and *A. pulcherrima* Ulmer. In the first of these exceptions, it is perhaps significant that Ulmer has given it a name suggesting a resemblance to *Triaenodes*, and it may be that when the male is recognized, it will prove to have genitalia of the *Triaenodes* pattern. In the second case, I have seen only two examples and in these, the genitalia are more like those of *Adicella* than *Triaenodes*.

As a result of these investigations, I have reversed my opinion (1956 : 146) when I transferred *Triaenodes darfurica* Mosely to *Adicella* on venational grounds, and I am also considering *Adicella sicula* Barnard to be a *Triaenodes*. I also propose that *Adicella triaenodiformis* Ulmer be placed provisionally in *Triaenodes*.

KEY TO MALES OF AFRICAN SPECIES OF *Triaenodes*

(EXCLUDING THOSE OF THE MEDITERRANEAN REGION).

The following species are omitted : *T. africana* Ulmer, figures of male genitalia inadequate ; *T. palpalis* Banks, no description of genitalia, sex not given ; *T. triaenodiformis* (Ulmer), known from female only.

1 Clasper with a curved spine arising from the base, in addition to a basal branch . . . 2
– Clasper without a curved basal spine . . . 6
2 Clasper slender, basal branch very small . . . **elegantula** Ulmer
– Clasper stouter, basal branch conspicuous . . . 3
3 Clasper, in side view, short, rectangular (known to me from literature only) **hastata** Ulmer
– Clasper, in side view, not rectangular . . . 4
4 Apex of clasper, in side view, obliquely truncate . . . **uncata** sp. n.
– Apex, in side view, acutely produced . . . 5
5 Apex of clasper directed caudad in ventral view . . . **darfurica** Mosely
– Apex incurved . . . **wambana** Mosely
6 Tenth segment with one (rarely two) arched spine, arising from a socket on dorsal surface . . . 7

– Tenth segment without such spine . . . 9

7 Clasper, in side view, short, about as long as deep, basal branch short and broad, apex scarcely bifid . . . ***falculata*** Kimmins

– Clasper, in side view, at least twice as long as deep, basal branch slender with bifid apex . . . 8

8 Cerci shorter than tenth segment (excluding spine). Lower fork of basal branch of clasper shorter than apical branch . . . ***sicula*** (Barnard)

– Cerci longer than tenth segment. Lower fork of basal branch of clasper longer and narrower than apical branch . . . ***serrata*** Ulmer

9 Basal branch of clasper slender, terminating in two long, slender forks . . . 10

– Basal branch stouter, not terminating in two long, slender forks . . . 12

10 Inner and outer margins of clasper, in ventral view, straight and parallel, clasper abruptly narrowed at apex . . . ***moselyi*** sp. n.

— Inner margins convex or sinuous, clasper not abruptly narrowed at apex . . . 11

11 Clasper, in ventral view, three times as long as wide, upper fork of basal branch clavate . . . ***difformis*** Mosely

— Clasper, in ventral view, twice as long as wide at base, tapering to apex. Upper fork spine-like . . . ***hickini*** Kimmins

12 Side lobes of tenth segment fused to form a single spine ; median lobe reduced to two small processes, or absent . . . 13

— Side lobes separate, except at base, spiniform ; median lobe well developed or reduced . . . 14

13 Basal branch of clasper simple, clavate, with a ventral spine . . . ***kimila*** Mosely

— Basal branch of clasper bifid, both forks arched downward . . . ***ghana*** Kimmins

14 Median lobe of tenth segment reduced to two small, transparent fingers at the bases of the cerci . . . ***legona*** Mosely

— Median lobe of tenth segment produced, finger-like, longer than cerci . . . 15

15 Clasper, from beneath, not longer than wide, basal branch strongly incurved ***polystachya*** Marlier

— Clasper, from beneath, distinctly longer than wide . . . 16

16 Apical part of basal branch of clasper flattened, blade-like, lower edge serrate and with a long acute tooth . . . ***clavata*** (Mosely)

— Apical part of basal branch forming a rounded lobe, with a stout, blunt projection beneath it . . . ***chelifera*** (Mosely)

Triaenodes moselyi sp. n.

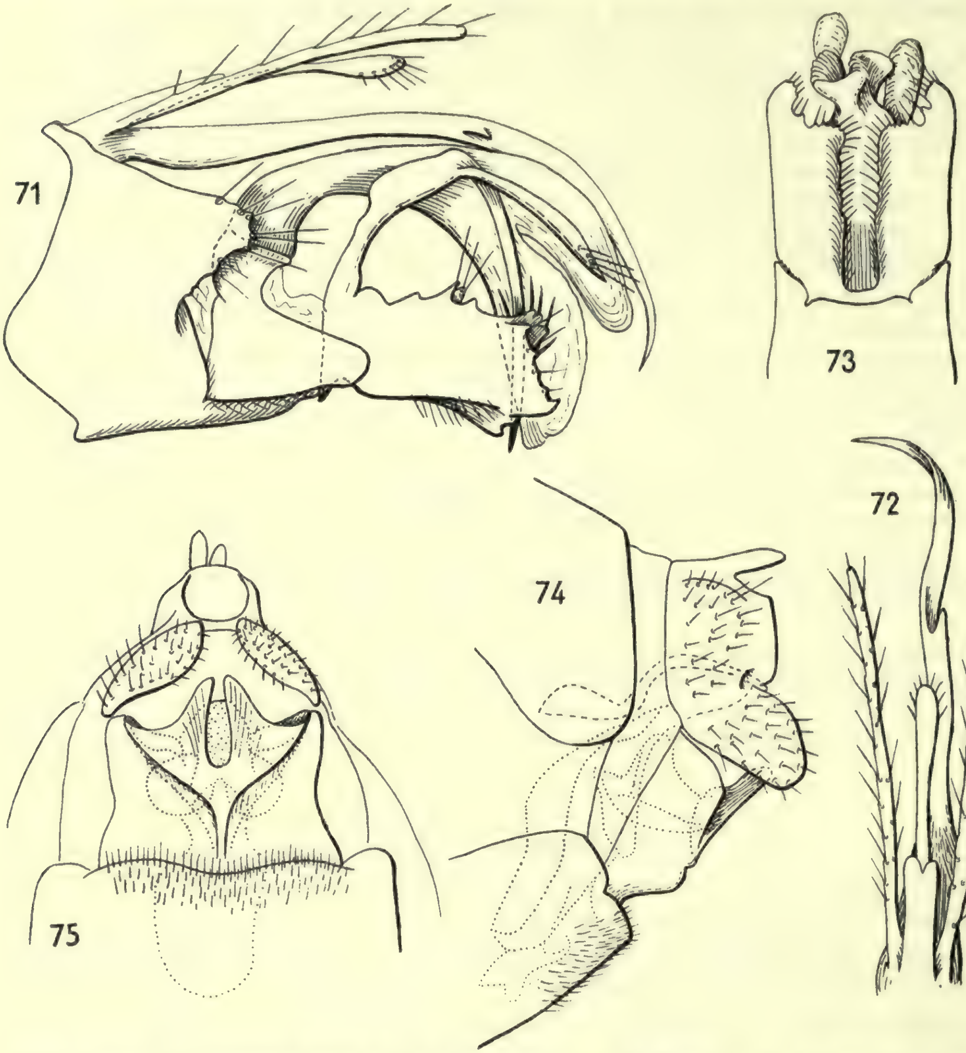
(Text-figs. 70–75)

Triaenodella hastata (Ulmer) Mosely, 1939 : 16.

UGANDA : Ruwenzori Range, xii.1934–i.1935, *F. W. Edwards*, Namwamba Valley, 6,500 ft., 1 ♂, Fort Portal, 5,000 ft., 5 ♀.

♂ HOLOTYPE (pinned). General colour pale tawny, with golden pubescence. Antenna finely annulated with fuscous, basal segment long and slender and with a plate covering the dorsal surface, although no pencil of hairs is visible beneath it. Palpi long, sparsely pubescent. Fore wing with golden pubescence and with indistinct spots of brownish pubescence in the apical half. Hind wing with sparse brownish pubescence. Fore wing rather narrow, discoidal cell long, almost twice as long as its footstalk. In hind wing, fork R_4 has a short footstalk.

♂ GENITALIA. Ninth segment long ventrally but reduced dorsally to a narrow transverse band. Side-pieces large and triangular, with rounded setose apices. Lateral margins at base of claspers extended upwards and inwards to support the base of the aedeagus. Median lobe of tenth segment inconspicuously trifid, the side branches very short, centre branch slender, slightly clavate and setose at apex. Side lobes fused together beneath the median lobe to form a long, blade-like, curved spine, with a short projection about mid-way on the left side. Cerci long and slender, of unequal length. Aedeagus arched, with a median dorsal furrow, membranous towards apex dorsally and with a membranous upper lobe on each side. Clasper about twice as long as wide, quadrate in side and ventral views, the outer apical angle, in ventral view, produced in a short, blunt, incurved process. Dorsal, apical and inner margins serrate, set with stout setae. Inner margins parallel. From the base of the left clasper, the upper margin is produced upwards in a long finger, which bifurcates about mid-way into two spines. The outer spine is directed tailward and is setose apically, the inner (and longer) spine is bent downwards alongside the aedeagus. In the right clasper of the type, this basal branch is either asymmetric or damaged, taking a bigger sweep basally and its apex is broken away.



Figs. 71–75. *Triaenodes moselyi* sp. n. Genitalia. 71, ♂, lateral; 72, ♂, tenth segment, dorsal; 73, ♂, claspers and aedeagus, ventral; 74, ♀, lateral; 75, ♀, ventral.

♀ ALLOTYPE. General appearance much as in male. Basal segment of antenna similarly elongate, but without the dorsal flap. Wings rather denuded but apparently with similar markings.

♀ GENITALIA. Eighth sternite with its apical margin sinuous, the margin itself and the area anterior to it densely setose. Ninth and tenth tergites fused, forming a short, truncate anal tube. From the dorsal surface of the fused segments arise two short, unequal, transparent processes, directed caudad. Sides of anal tube raised to form two low, hairy warts. Lateral gonapophyses short, foliate, with rounded apices, directed obliquely downward, outer surfaces convex and setose. Beneath them is a broad, bifid subgenital plate, deep in side view, the branches directed obliquely upwards between the lateral gonapophyses. From beneath, the branches are separated by a deep narrow excision.

Length of fore wing, ♂, 8·5 mm.; ♀, 9–9·5 mm.

♂ HOLOTYPE (now mounted as microscope preparations), ♀ ALLOTYPE, pinned (abdomen mounted as microscope preparation) and ♀ paratypes in British Museum (Natural History). These specimens were originally determined by Mosely as *Triaenodella hastata* (Ulmer), but even allowing for the fact that Ulmer's figure of the male genitalia was drawn from a dried example, I do not think that they could justifiably be placed as *hastata*. The latter is shown with definite curved, blade-like basal spines arising from the clasper and the basal branch is clavate, not bifid. *T. moselyi* is closely related to *T. hickini* Kimmins (1957 : 22) from Kenya, both in male and in female genital structures. In the male the centre branch of the median lobe of the tenth segment is much longer than the side branches and the two side lobes are fused into a single spine. In side view, the clasper is more rectangular and in ventral view the inner margins are parallel to each other and to the outer margins. In the female, there are two dorsal processes on the fused ninth and tenth segments and the lower lip of the anal tube is not produced and the lateral gonapophyses are rounded (not acute) apically.

Triaenodes uncata sp. n.

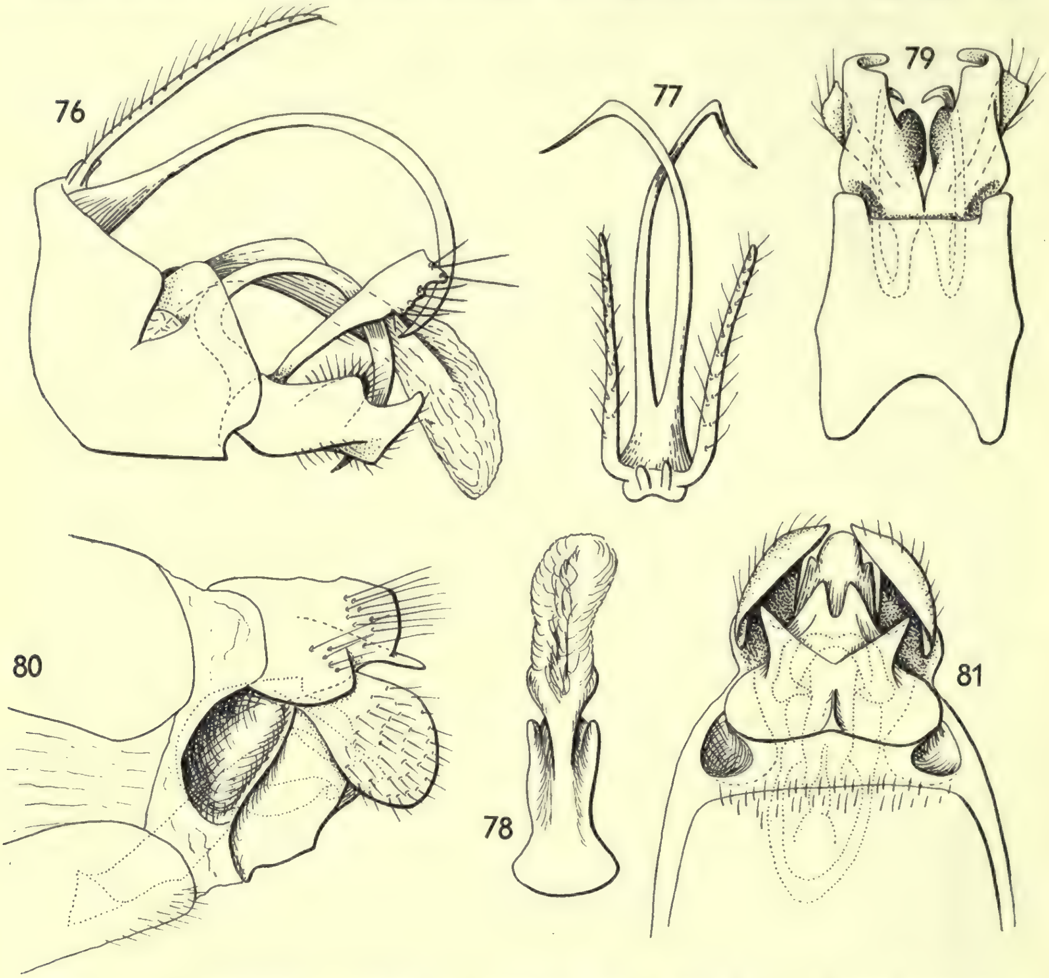
(Text-figs. 68, 69, 76–81)

UGANDA: Mbanga Forest, Mpigi, *P. S. Corbet*, 1 ♂, 4 ♀.

♂ HOLOTYPE (in alcohol). General colour pale tawny yellow. Antenna finely annulated with fuscous, basal segment without dorsal flap but with a small, median, longitudinal carina on apical half of dorsal surface, which curves over outwards. Fore wing with golden pubescence and traces of fuscous pubescence (rather denuded). Apical half of stem of M present. Cu_{1b} represented by a weak cross-vein from anastomosis to $Cu_2 + A$. In hind wing, R_{4+5} and M_{1+2} confluent for a short distance.

♂ GENITALIA. Resembling *T. wambana* Mosely (1939 : 15), but differing in detail. Ninth segment with prominent, triangular side-pieces and below them there is a triangular excision of the lateral margin. Tenth segment comprising a pair of long, slender spines, strongly arched in side view, their apices crossing in the type. Above these spines (which are fused basally) are two long, slender cerci and two short processes. Aedeagus arched basally, with a median dorsal groove, apical part membranous. Clasper stout, about twice as long as wide in side view, its upper margin elevated about mid-way, then excised before the acute apex. Lower margin sinuous in side view, apex obliquely truncate. In ventral view, the clasper tapers gradually from base almost to apex and is then suddenly constricted to a finger, curving inwards from the outer angle. Inner margin of the clasper produced upwards in apical half to form a rounded setose lobe. At the extreme base of the clasper there arises, from the dorsal margin, a strong, sickle-shaped spine, adjacent to the stem of the aedeagus. Just posterior to this spine arises the basal branch, slender basally, directed obliquely upward and caudad, dilating apically and setose. This branch is very thin and lightly sclerotized and in the course of mounting has twisted spirally and changed its direction.

♀ ALLOTYPE (in alcohol). General appearance as in male. Antenna without median carina on basal segment. In fore wing there is a weak, incomplete vein representing the basal half of the stem of M. Cu_{1b} normal. In hind wing, R_{4+5} and M_{1+2} touching or linked with a short cross-vein.



FIGS. 76–81. *Triaenodes uncata* sp. n. Genitalia. 76, ♂, lateral; 77, ♂, tenth segment, dorsal; 78, ♂, claspers, ventral; 80, ♀, lateral; 81, ♀, ventral.

♀ GENITALIA. Apical margin of eighth sternite straight, setose. Ninth and tenth segments fused, forming a short anal tube, ventral margin of which is produced in a short spatulate lobe. Sides of anal tube convex, with long setae. Lateral gonapophyses large, ovate, outer surfaces convex. Subgenital plate complex; on each side at the base is a deep, ovate hollow. From beneath, the plate is broad, with rounded lateral margins and a raised median carina at base.

The anterior margin has a wide, V-shaped excision, outer angles acute. Beyond the excision is another triangular plate, convex and with a deep and narrow apical excision. This plate is directed obliquely upwards between the lateral gonapophyses.

Length of fore wing, ♂, ♀, 7 mm.

♂ HOLOTYPE, ♀ ALLOTYPE (mounted as microscope preparations) and ♀ paratypes in 2% formaldehyde solution, in British Museum (Natural History). The male genitalia of this species are similar in structure to those of *T. wambana* Mosely. The chief differences are in the clasper, which in side view is shorter and obliquely truncate at apex ; the inner marginal lobe is smaller ; the sickle-shaped spine has no spur. From beneath, the clasper tapers much more abruptly at its apex.

Parasetodes maguira (Mosely)

Leptocerus maguirus Mosely, 1948 : 32, figs. 1–4.
Parasetodes maguira (Mosely) Kimmins, 1956 : 124.

Mosely describes and figures the upper branch of the clasper as being clavate or truncate at the apex. Examples from the Vaal and Wilge Rivers have genitalia almost identical with the figure of *maguira*, apart from the fact that the apex of the upper branch of the clasper is produced in a slender finger. Mosely's description was based upon a single example ; I have studied the preparation carefully and, under a ¼ in. objective, it is evident that the extreme apex is damaged and it is probable that there was originally a similar slender finger in the type of *maguira*.

Athripsodes harrisoni (Barnard)

Leptocerus harrisoni Barnard, 1934 : 337–338, figs. 25–26.
Leptocerus calcaratus Barnard, 1941 : 106–07; fig. B **(syn. nov.)**.

Barnard distinguished his species *calcaratus* from *harrisoni* on the presence of an acute tooth on each side of the ninth segment (10th tergite of Barnard) and slight differences in the shape of the clasper. These differences seem to me to be no more than individual variation, especially as a paratype of *harrisoni* shows traces of the lateral acute processes on the ninth segment.

OECETIS McLachlan

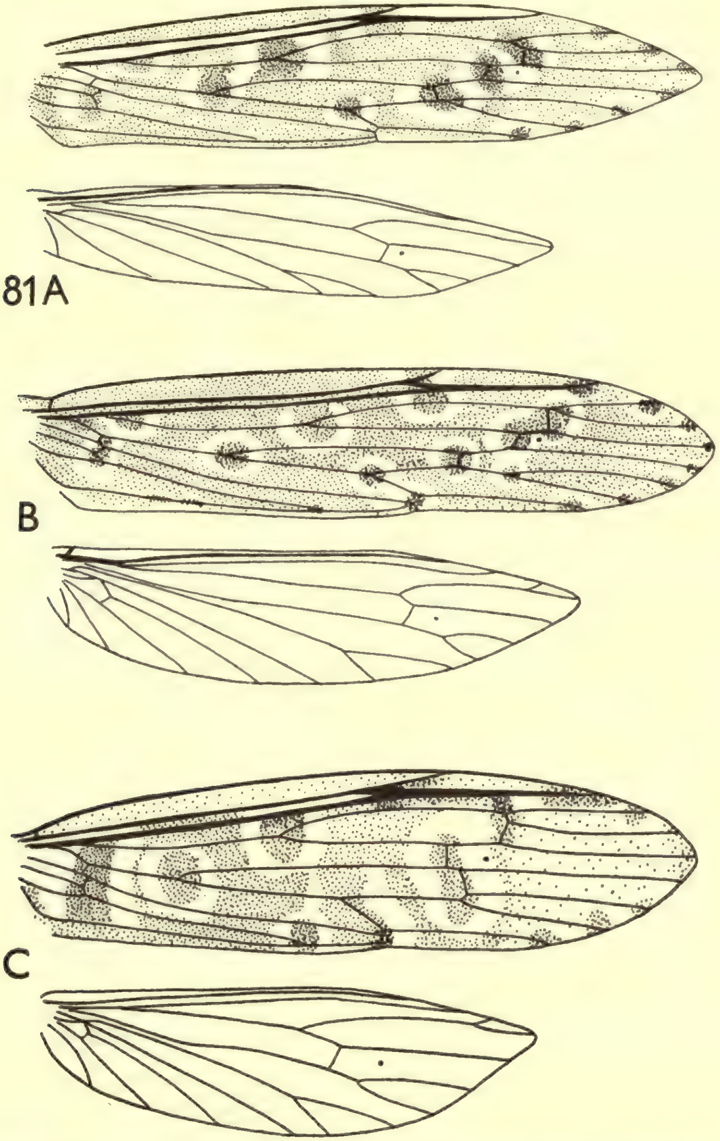
1877 : 329–330 (type-species *Leptocerus ochraceus* Curtis, 1825).
Setodellina Lestage, 1919 : 202, fig. 5. (type-species *Setodellina albopunctata* Lestage, 1919) **(syn. nov.)**.

The genus *Setodellina* was based by Lestage upon a single example, but in neither the generic nor the specific description does he give any indication of the sex of this example, merely remarking that the genitalia are difficult to describe on account of the bad state of the apex of the abdomen. He figures the venation and compares it with *Pseudosetodes* Ulmer. No comparison is made with *Oecetis*, with which genus it agrees in most characters other than the absence of fork R_2 in the hind wing, a character which has since been found to be variable in the genus *Athripsodes*. His figure shows Sc and R_1 to be completely fused in the fore wing but no comment is made on this point ; in the hind wing these veins are shown as separate for most of their length but in his description they are said to be almost fused and scarcely visible.

Ulmer (1923 : 15) placed a second species (*S. brunnescens*) in the genus *Setodellina*, figuring the venation and the male genitalia. The hind wing of this species also lacks the fork R_2, but the wings are broader than in the figure of *S. albopunctata* and Ulmer comments that they are otherwise similar to those of *Oecetis*. The genitalia of *S. brunnescens* resemble those of *Oecetis gradata*, both having the cerci more or less fused to the tenth segment, forming a broad plate. Martynov (1936 : 271) placed a number of Asiatic and African species into *Setodellina* and gave an extended diagnosis of the genus, including genital characters, particularly the fused cerci. As regards venation, he remarks that apical fork R_2 may be present or absent in the hind wing, a fact that lessens its value as a character separating *Setodellina* from *Oecetis*. As far as I known, Martynov did not have the opportunity of studying the type of *S. albopunctata* and the genital characters which he gives for *Setodellina* are based upon *S. brunnescens* Ulmer, upon his own new species and upon various other species of *Oecetis*, which he had transferred to *Setodellina*. In my own paper (1956 : 135), I accepted Martynov's interpretation of the genus *Setodellina*, but as material of further African species has come to hand it has become increasingly difficult to decide when the cerci cease to be fused with the tenth segment to form a broad plate or anal tube, some species being intermediate in this respect between *Setodellina* and *Oecetis*, as defined by its type-species, *O. ochracea* (Curtis). Both have the inflated, somewhat globular aedeagus with a downwardly-hooked apex.

Thus a conception of the genus *Setodellina* had grown up which was based largely upon species subsequently placed in it and which were not necessarily congeneric with it. I have been able to study the holotype of *Setodellina albopunctata* Lestage. The specimen as sent to me lacked the preparation of the hind wing (Lestage had removed both left wings for figuring and attached them by their bases to a card with gum ; the hind wing has at some time become detached from the gum and was missing). For greater safety, I have now mounted the left fore wing and the right hind wing (which was somewhat damaged) between two pieces of celluloid. It is clear from these wings that Lestage's figure of the venation is incorrect as far as the subcosta and radius of both wings are concerned. I can see no definite evidence of fork R_2 in the remaining hind wing, although there is a slight thickening of the vein at the point where the fork might be expected to occur. A female of *albopunctata* in the British Museum (Nat. Hist.) from Nigeria, Gadau, has a definite fork R_2 in the hind wing. I am refiguring the wings of the type (with fore wing reversed) and have attempted an impression of the pigmentation of the fore wing. The pattern is rather more definite than I had expected from Lestage's description and recalls that of examples from Uganda determined by myself as *S. maculipennis* (Ulmer). Examination of the abdomen of the type of *albopunctata* suggested that it was a female, an impression which was confirmed by clearing in KOH solution.

Comparison of the wing venation of the female holotype of *albopunctata* with Ulmer's figure of *maculipennis* (1922 : 61) reveals one difference which, though not of generic importance, may be considered specific (Text-figs. 81A–C). In the fore wing of ***albopunctata***, M forks basad of the r–m cross-vein. M_{3+4} simulates a cross-vein from M to Cu_{1a} and fuses with the latter vein for a short distance, appearing as a short stalk to the false fork formed by the divergence of M_{3+4} and Cu_{1a}. In Ulmer's figure (and in the Uganda examples now placed as ***maculipennis***) the fork of M is situated beyond the r–m cross-vein and M_{3+4} does not fuse with Cu_{1a} but is linked to it by a cross-vein. The use of this character to separate *Setodellina* from



FIGS. 81A–C. *Oecetis* spp., wings. 81A, *O. albopunctata* (Lestage), ♀ holotype ; B, presumed male of *O. albopunctata* ; C, *O. maculipennis* Ulmer, male.

Oecetis is not supported by other characters in the various species examined and it does not seem worth while to maintain any longer the separation of these two genera.

Oecetis albopunctata (Lestage)

(Text-figs. 81A, B, D, E, H–J)

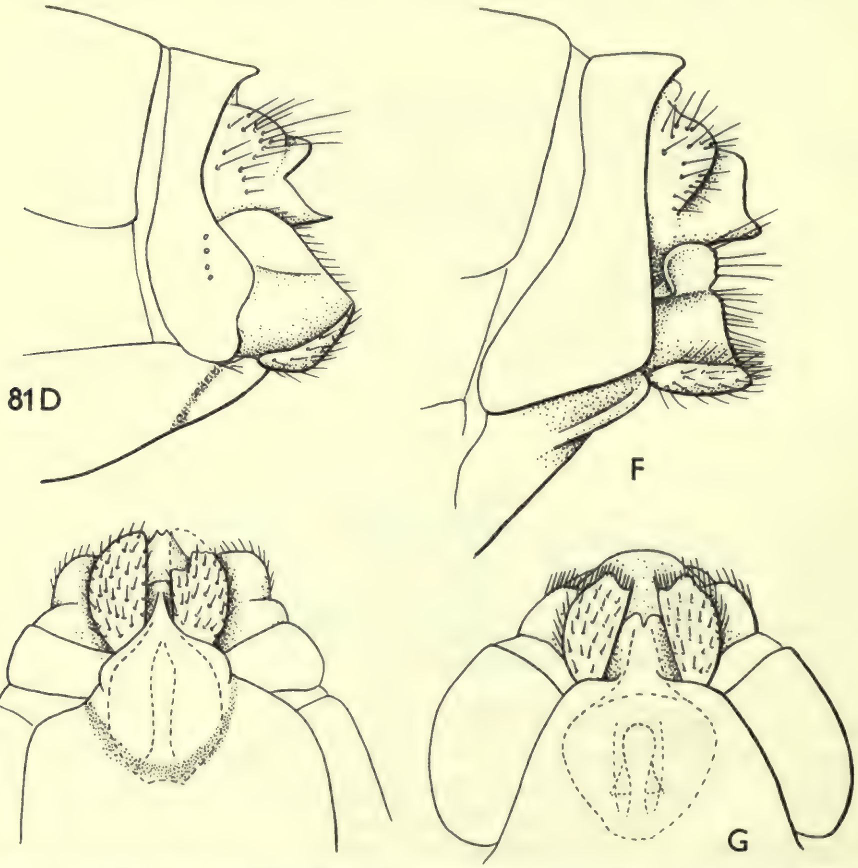
Setodellina albopunctata Lestage, 1919 : 202–203, fig. 5 (Congo).

UGANDA : Albert Nile, Pakwach, 28–29.iv.1956, near Laropi, 27–28.iv.1956, *P. S. Corbet*, ♂.

NIGERIA : Gadau, ii.1933, *Buxton & Lewis*, 1 ♀.

S. AFRICA : Pongola River, Pongola Settlements, 17.ix.1954, 1 ♂.

♀ GENITALIA OF HOLOTYPE. Eighth sternite produced at the centre of its apical margin in an acutely cuspidate subgenital plate, which is margined at its base by a narrow band of brownish pigment, which simulates an excision. Ninth tergite rather short and deep, the centre of its



FIGS. 81D–G. *Oecetis* spp., female genitalia. 81D, *O. albopunctata* (Lestage), holotype, lateral ; E, the same, ventral ; F, *O. maculipennis* Ulmer, lateral ; G, the same, ventral.

apical margin acutely produced in side view. Tenth segment and cerci fused to form an anal tube with upper and lower margins produced. Lateral gonapophyses large, thin, the ventral margin of each turned outwards, slightly hairy, forming a pair of somewhat reniform lobes in ventral view.

Amongst examples from various localities, originally determined as *maculipennis* Ulmer, a short series of males from Albert Nile, Pakwach has the form of *M* in the fore wing basad of the *r–m* cross-vein and the pigmentation of the membrane much as in the type of *albopunctata*. Fork R_2 is present in the hind wing (although I do not attach much importance to this), the examples are smaller than *maculipennis* and show certain differences in male genitalia. It is proposed to consider them as the probable male of *O. albopunctata* (Lestage).

♂ GENITALIA. Ninth segment with its dorsal apical margin moderately produced at its centre. Side-pieces broadly triangular. Cerci ovate, almost completely fused to the tenth segment, which projects somewhat beyond it in a convex plate with a shallowly excised apical margin. Aedeagus short, moderately inflated, its apex produced downwards in a short lobe, which is rounded in side view (acute in S. African example). Clasper slender in side view, extending beyond the tenth segment. It curves slightly upwards, upper margin sinuously curved. The apex is not strongly curved upwards beyond mid-way. From beneath, the clasper is moderately broad at base, apical half constricted and incurved, inner and outer margins sinuous.

Oecetis maculipennis Ulmer

(Text-figs. 81C, F, G, K–M)

1922 : 61–63, figs. 22–25 (Egyptian Sudan).

Specimens from Uganda and Ghana determined by myself as *maculipennis* agree fairly well with Ulmer's figures. New figures of the ♂ genitalia are given from an example from Lake Victoria, for comparison with *albopunctata*, in which it will be seen that the side-pieces of the ninth segment are narrower than in the presumed *albopunctata*, and the claspers are broader basally in side view and are curved sharply upwards in the apical half. The chief difference between these figures and those given by Ulmer is that in ventral view the claspers are incurved apically, not divergent as shown by Ulmer.

The female genitalia also follow the pattern of *albopunctata*, but as in the male, they differ in detail. The ninth tergite in side view has the apical margin almost straight and the lower lateral margin is much wider. The lateral gonapophyses are rather shorter and the apical margin in side view is less obliquely truncate. In ventral view the apical margin is sinuous. Subgenital plate more abruptly shouldered. Cerci less closely fused to the tenth segment.

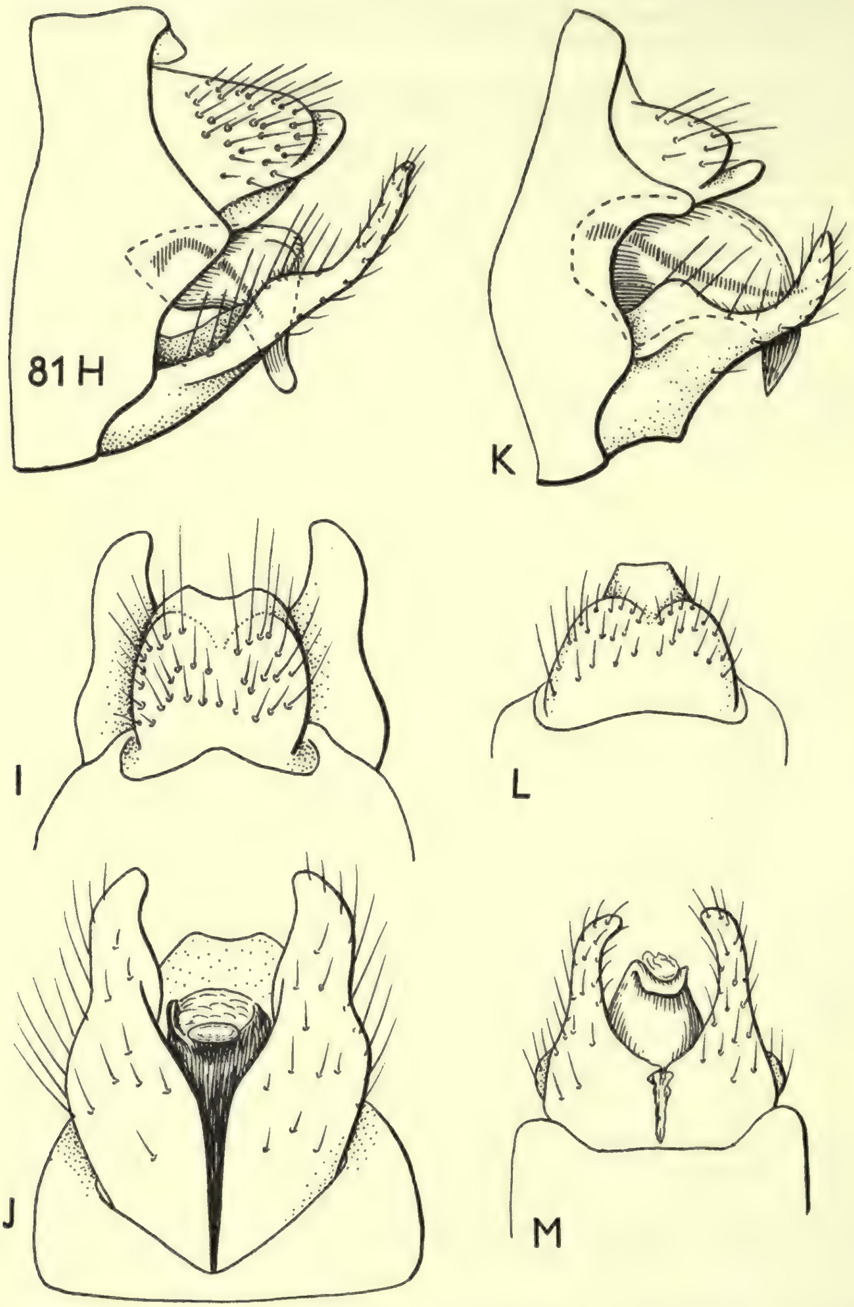
Oecetis absimilis sp. n.

(Text-figs. 82–88)

UGANDA : Mbanga Forest, Mpigi, *P. S. Corbet*, 2 ♂.

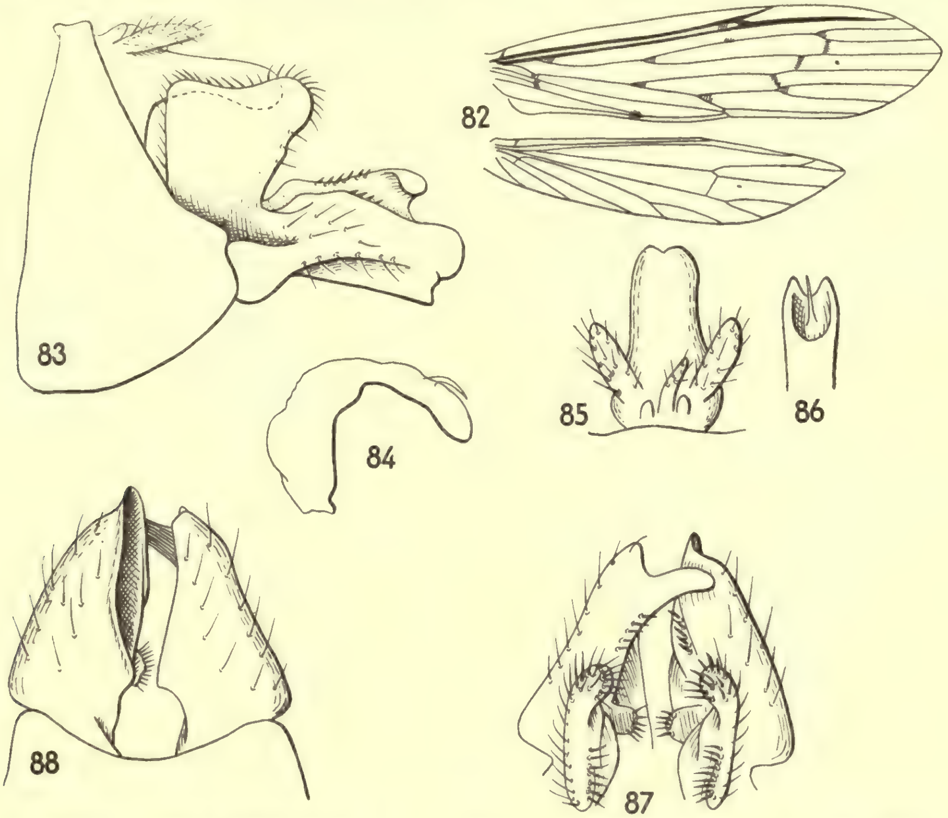
♂ HOLOTYPE (in alcohol). General colour pale ochraceous. Antennae with fine piceous annulations, basal segment tinged with pale fuscous. Palpi and anterior legs with sparse fuscous pubescence. Anterior wing with sparse pale fuscous pubescence, the membrane marked with fuscous as in the figure.

♂ GENITALIA. Ninth segment narrowed dorsally. Tenth segment forming a narrow, hood-like plate, dilated basally in dorsal view and with the apex slightly excised. At its base, on the dorsal surface, arise two very short, transparent processes, one on each side of a longer, slender finger, bearing a few setae. Cerci short and blunt, rather less than half the length of the tenth segment.



FIGS. 81H–M. *Oecetis* spp., male genitalia. 81H, presumed *O. albopunctata* (Lestage), lateral; I, the same, dorsal; J, the same, ventral; K, *O. maculipennis* Ulmer, lateral; L, the same, dorsal; M, the same, ventral.

Aedeagus short, strongly arched downwards, its apical part with a median dorsal furrow, in which arises a short, slender, arched spine. Clasper large, with a flattened, erect basal lobe, its apex broader than its base, slightly concave in side view and armed with strong setae. The main part of the left clasper is roughly rectangular in side view, slightly arched and with the upper apical angle rounded. From above or beneath, the clasper is subtriangular, upper margin bearing a few stout setae, inner surface concave apically. The upper margin of the right clasper is produced in an inwardly directed, spatulate lobe, overlapping the left clasper. Internally, near the base of each clasper, is a strongly setose lobe.



FIGS. 82–88. *Oecetis absimilis* sp. n. ♂. 82, wings ; 83, genitalia, lateral ; 84, aedeagus, lateral ; 85, tenth segment, dorsal ; 86, apex of aedeagus, dorsal ; 87, claspers, dorsal ; 88, the same, ventral.

Length of fore wing, ♂, 6 mm.

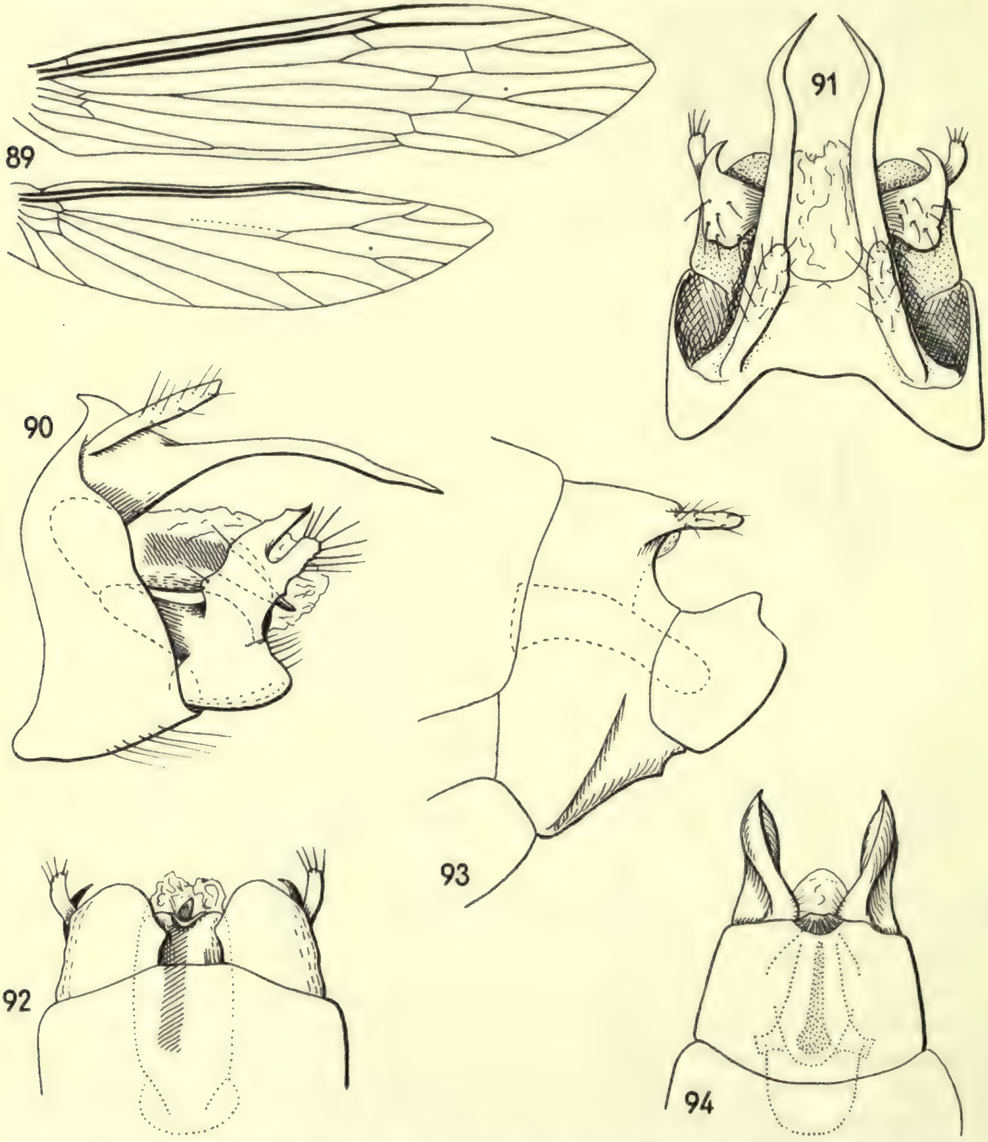
♂ HOLOTYPE (in 2% formaldehyde solution), ♂ paratype mounted as microscope preparations, in British Museum (Nat. Hist.). This species appears to belong to the *kathia-angustipennis* group (Mosely, 1939 : 17–18), in which there is a basal lobe on the clasper. In *O. absimilis*, this lobe is more developed than in most of them and it also differs from them in having the tenth segment in the form of a hood rather than a pair of spines. The specific name refers to the dissimilarity in the form of the right and left claspers.

Setodes njala sp. n.

(Text-figs. 89–94)

SIERRA LEONE: Njala, 1.iv.1932, *E. Hargreaves*, 1 ♂, "*Setodes sp. n.* det. M. E. Mosely", 1 ♀, "*Setodes sp.* det. M. E. Mosely".

♂ HOLOTYPE (pinned). Head tawny yellow, with golden pubescence and three snow-white longitudinal lines on vertex. Antenna tawny yellow, basal segment with a snow-white line



FIGS. 89–94. *Setodes njala* sp. n. 89, wings, ♂; 90, ♂, genitalia, lateral; 91, ♂, dorsal; 92, ♂, claspers and aedeagus, ventral; 93, ♀, genitalia, lateral; 94, ♀, ventral.

externally. Palpi tawny. Thorax tawny, with golden pubescence and three snow-white longitudinal lines. Legs pale luteous. Fore wing with dense golden brown pubescence, most of the cells with a longitudinal white line bordered with fuscous pubescence. Apical cells with a white spot bordered with fuscous. Hind wing hyaline.

♂ GENITALIA. Ninth segment rather short, its dorsal margin short and fused with the tenth segment. Cerci about as long as the ninth segment, slender, somewhat flattened dorsoventrally. Tenth segment produced in two long, slender, slightly sinuous spines arising from a common base. Aedeagus short, stout, apex downcurved, upper surface membranous and enclosing a shorter, stout spine. Clasper short and stout, the lower part forming a rounded plate, whose inner margin is slightly produced. Upper portion produced in two short processes, the upper incurved and acute, the lower digitate and hairy.

♀ ALLOTYPE. Resembling the male but rather smaller. ♀ GENITALIA. Ninth segment forming a complete ring. From its upper margin project two short, digitate lobes, bearing a few setae. Centre of the ventral margin with a small rounded depression, giving the appearance of an excision. Lateral gonapophyses large, subquadrate, from the side, shallowly excised at the apex. From beneath, they are acute apically, lower margin carinate, inner surface convex, outer surface concave basally. Tenth tergite reduced to a small, rounded, transparent knob between the digitate processes of the ninth segment. Within the ninth segment is a shallow, convex subanal plate, with a rounded apex.

Length of fore wing, ♂, 4 mm.; ♀, 3·7 mm.

♂ HOLOTYPE pinned (with one pair of wings and the abdomen mounted as microscope preparations), ♀ ALLOTYPE pinned (abdomen cleared and in glycerine), in British Museum (Nat. Hist.). The markings of the fore wing recall those of *Hemileptocerus gregarius* Ulmer (1922 : 56) and *H. hargreavesi* (Ulmer, 1931 : 25), but the hind wing is relatively less wide than in these species. The types are smaller than any described species of *Setodes* from Africa known to me, and the ♂ genitalia are also different.

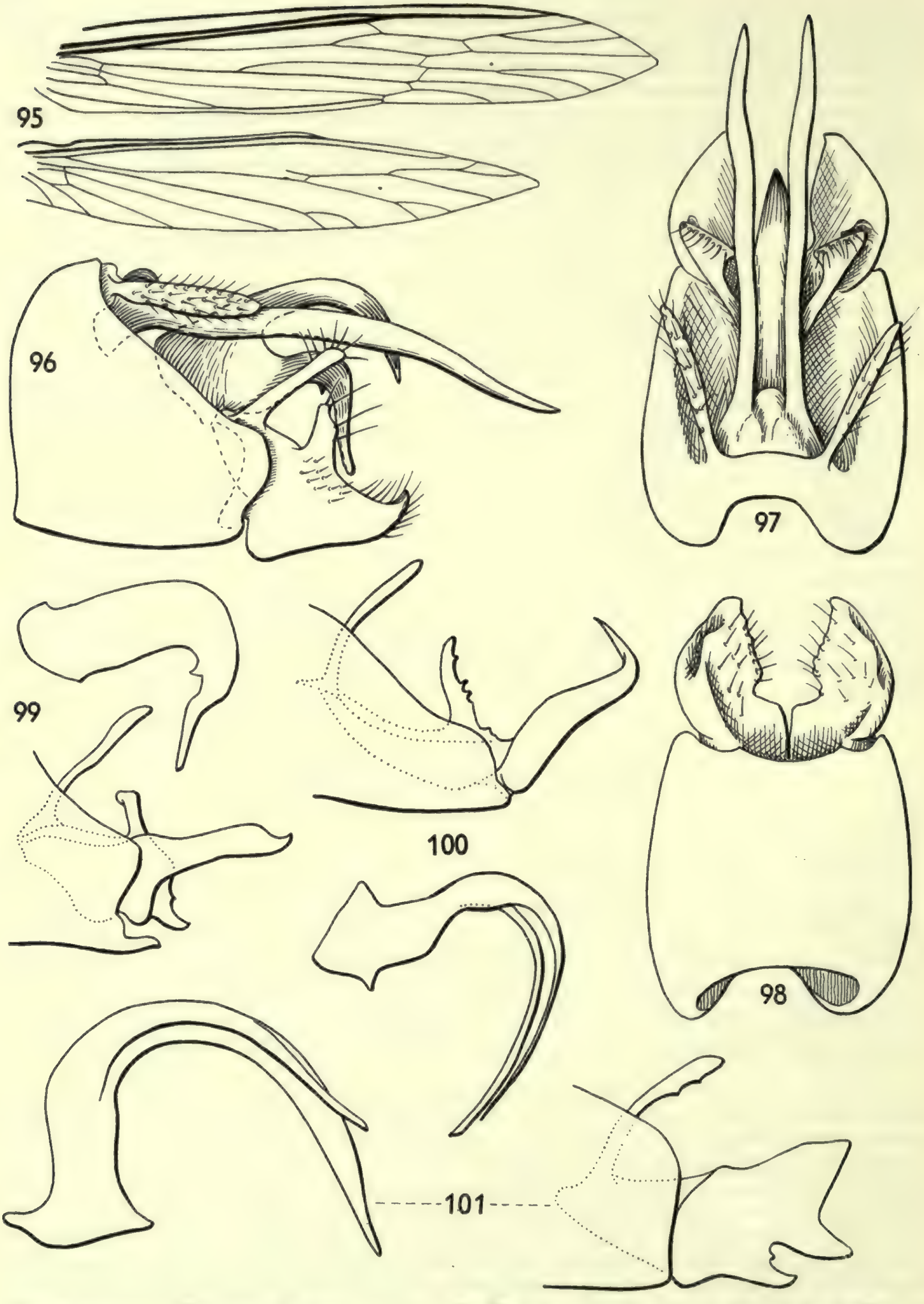
***Trichosetodes triangularis* sp. n.**

(Text-figs. 95–101)

S. AFRICA : Orange Free State, Swinburne, 9.xii.1958, 1 ♂.

♂ HOLOTYPE. The specimen was collected in alcohol and is rather rubbed and faded. The wings bore only traces of pubescence and no description of the wing pattern (if any) can be given. The hair tufts on the basal segment of the antennae are likewise abraded, but these segments are of the typical elongate, cylindrical form of *Trichosetodes*. The wings are more acute apically than in *T. anysa* Mosely (1948 : 39), *semibrunnea* Ulmer (1923 : 13) or *lacustris* Kimmins (1953 : 278).

♂ GENITALIA. Conforming to the general pattern of the African species. Ninth segment cut back dorsally to a narrow, transverse band. Tenth segment produced in a pair of simple, slender spines, extending beyond the apices of the claspers. Cerci short, about one-third the length of the spines of the tenth segment. Aedeagus broad at its base in side view, arched sharply downward and tapering to a blunt apex. From its dorsal surface arises a strong, acute paramere, arching over the aedeagus and separated from it by a wide gap. Clasper triangular in side view, stout at base, apex curving upward and acute. On its upper surface arise two processes, the basal one the longer and more slender, its apex triangularly dilated inwardly in dorsal aspect. The second one arises about mid-way, is about half as long as basal and is stouter. From beneath, the clasper is convex on its outer margin. Inner margin more or less straight, with a small



FIGS. 95–101. *Trichosetodes* spp. ♂. 95–98, *T. triangularis* sp. n. 95, wings; 96, genitalia, lateral; 97, dorsal; 98, claspers, ventral; 99, *T. lacustris* Kimmins, aedeagus and claspers, lateral; 100, *T. anysa* Mosely, the same aspect; 101, *T. semibrunnea* Ulmer, same aspect.

excision in its basal half. Ventral apical margin of ninth segment shallowly excised at its centre.

Length of fore wing, 7 mm.

♂ HOLOTYPE mounted as microscope preparations, in British Museum (Nat. Hist.). This species differs from the other described African species in its stout, triangular clasper and the wide separation of the paramere and aedeagus. This very noticeable feature led me to re-examine the preparations of the other species. Indications of a slender paramere occur in both *semibrunnea* and in *anysa*, but there is no evident paramere in *lacustris*. Figures are given of the lateral aspect of the aedeagus and clasper of the other three species for comparison.

Leptocerus inflatus sp. n.

(Text-figs. 102–107)

S. AFRICA: Transvaal, Vaal River, above Klip confluence, x.1957, 2 ♂, 1 ♀; Vaal Barrage, 1957, 2 ♂, 4 ♀.

♂ HOLOTYPE (collected in alcohol). Head brown, two basal segments of antenna pale brown, remaining segments pale luteous, annulated with piceous. Palpi dull brownish, with fuscous pubescence. Thorax brown. Legs very pale brownish. Fore wing with fuscous pubescence, with a patch of creamy white, broadened hairs on anterior margin near apex of *Sc*, extending triangularly as far as anterior margin of discoidal cell, and with iridescent scales extending to posterior margin of cell. There are traces of creamy white hairs just basad of the discoidal cell and a patch of iridescent scales between *Rs* and Cu_{1a} at the same level. A few scattered iridescent scales near base of wing. Wings narrow, acute, hind wing tapering more gradually than in *L. neavei* (Mosely, 1932*a* : 130).

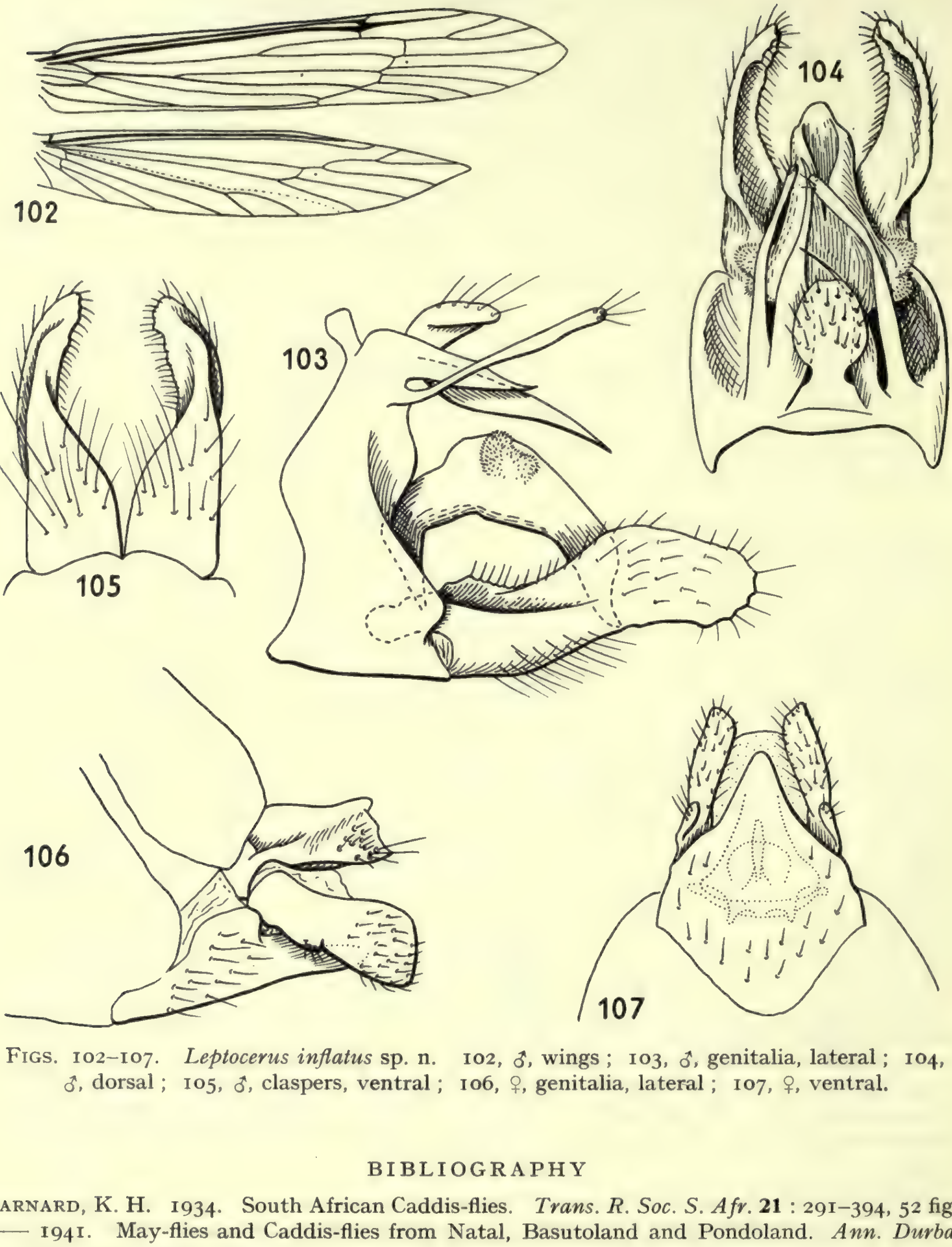
♂ GENITALIA. Ninth segment reduced dorsally to a narrow, transverse band. Ventral margin slightly produced, with a small median excision. Tenth segment with an ovate median lobe, apex truncate, in side view raised above the side lobes. The latter consist of two asymmetric blade-like spines and two slender digitate processes, about equal in length to the longer of the spines and terminating in a few setae. Aedeagus strongly arched downward, with a median dorsal trough in the apical third, apex narrowed and rounded in ventral view. On each side, at about mid-way, the upper margin is expanded in a membranous, bilobed process, covered with minute setae. Clasper gently sinuous in side view, without the basal ventral projection present in the other described African species. Its dorsal margin towards the base is slightly elevated. In ventral view, the clasper is broad at its base, tapering to a narrow, slightly incurved apex.

♀ ALLOTYPE (collected in alcohol). General appearance much as in male, but the iridescent scales on the fore wing are few, possibly denuded.

♀ GENITALIA. Eighth sternite produced in a more pigmented subgenital plate, its apical margin triangular, lateral margins slightly concave, apex rounded. Ninth and tenth tergites fused, the tenth more sclerotized and bearing patches of setae, apical margin rounded. Lateral gonapophyses extending beyond the apex of tenth segment, elongate, slightly dilated and obliquely truncate.

Length of fore wing, ♂, ♀, 7 mm.

♂ HOLOTYPE (mounted as microscope preparations), ♀ ALLOTYPE (in 2% formaldehyde solution) in British Museum (Nat. Hist.), ♂, ♀ paratypes in Dr. Scott's collection. This species is perhaps closest to *L. neavei* (Mosely) in male genital structure, but it differs from all the described African species of *Leptocerus* in the absence of the ventral projection at the base of the clasper.



Figs. 102–107. *Leptocerus inflatus* sp. n. 102, ♂, wings; 103, ♂, genitalia, lateral; 104, ♂, dorsal; 105, ♂, claspers, ventral; 106, ♀, genitalia, lateral; 107, ♀, ventral.

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NOTES ON THE EPITOLINAE WITH DESCRIPTIONS OF A NEW GENUS AND NEW SPECIES AND SUBSPECIES (LEPIDOPTERA : LYCAENIDAE)

4 JUN 1962

T. H. E. JACKSON

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BY

T. H. E. JACKSON
Kapretwa, Kitale, Kenya

4 JUN 962

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By T. H. E. JACKSON

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SYNOPSIS

The genus *Epitola* is brought up to date with further association of the sexes. New species and subspecies are described, as well as a new genus.

Genus ***EPITOLA*** Westwood

THE genus *Epitola* Westwood was revised by P. J. L. Roche (1954). In this excellent paper will be found a history of the genus, a check list of the species, a working key to the males and descriptions of all new species to that date. Since then, however, many new species have been discovered and an attempt is made here to bring the genus up to date, and further, to integrate the females. The latter is admittedly a difficult task ; it was scarcely touched by Aurivillius in Seitz (1920), and not at all by Roche, but considerable evidence has accumulated either from species taken *in cop.*, bred, or taken together in large numbers to warrant a preliminary arrangement, and it is felt that this is long overdue. In addition, a careful study of the underside markings is sometimes sufficient. The arrangement of the species in this paper largely follows that of Roche but, with the exception of the first two groups and the last, they have been rearranged according to the colour and markings of the females. This produces a large measure of agreement with Roche's keys, but some interesting discrepancies. With the exception of those of a few type specimens, which are not available for study, all records mentioned in this paper have been personally checked by the present author or by Monsieur H. Stempffer of Paris. All types are in British Museum (Nat. Hist.) unless otherwise stated.

THE *HEWITSONI* GROUP

Epitola crippsi Stoneham

♀ *Epitola crippsi* Stoneham, 1933 : 1, pl. 2.
Type. KENYA : Soy. (Stoneham Mus., Kenya.)

♂ undescribed : the male of this species was taken by the writer some years ago at Busia, Uganda and forwarded to Europe. The specimen has unfortunately been mislaid and so the description cannot be included here. The male is almost identical with the female, but with sex brands.

Recorded from : KENYA : Soy ; UGANDA : Busia.

Epitola hewitsoni Mabille

(Pl. 13, figs. 124, 130)

♂ *Epitola hewitsoni* Mabille, 1877 : 221.
Type. ANGOLA : Cabinda, Landana. (Paris Mus.)
Epitola hewitsoni Mabille ; Seitz, 1920 : pl. 65, *d*.

Recorded from : CAMEROONS : Bitje ; ANGOLA : Cabinda.

Epitola hewitsonioides Hawker-Smith

♂, ♀ *Epitola hewitsonioides* Hawker-Smith, 1933 : 11.
Types. CONGO : Middle Lowa Valley, near Walikale.

Recorded from : CAMEROONS : Bitje ; FR. EQUAT. AFRICA : Etoumbi, Mambili Forest ; CONGO : Equator, Eala, Lomami River.

Epitola miranda miranda Staudinger

(Pl. 1, fig. 1, Pl. 2, fig. 10)

♂ *Epitola miranda* Staudinger, 1889 : 176.
Type. SIERRA LEONE. (Staudinger Coll.)
Epitola miranda Staudinger ; Seitz, 1920 : pl. 64, *e*.

♀. Legs dark brown with paler spots at the joints ; palps light brown below with black tips, dark brown above ; eyes dark brown ; frons dark brown with two pale lines ; antennal shaft black above, minutely checkered white below ; club with orange tip.

Upperside forewing : brown ; a subapical series of elongate yellowish spots in 5, 6 and 7, 4 mm. long, and a yellow streak in 8. A faint pale spot astride vein 2.

Upperside hindwing : brown, immaculate.

Underside : similar to the male, but paler, the yellow fore wing spots reproduced below, but paler.

Length of fore wing : 27 mm.

Neallotype ♀. SIERRA LEONE. Rothschild bequest.

Recorded from : SIERRA LEONE ; NIGERIA : Lagos Dist., Oshodi and Kaba Prov. ; CAMEROONS.

Epitola miranda vidua Talbot

(Pl. 1, fig. 2, Pl. 2, fig. 11)

♀ *Epitola miranda vidua* Talbot, 1935 : 75.
Type. UGANDA : Sesse Isles, Bugalla Is., Lutoboka. (Hope Dept., Oxford.)

This is not a well-differentiated subspecies and the male differs scarcely at all from *miranda miranda*.

♂. Legs dark brown, faintly paler at the joints ; palps light brown below with black tips, dark brown above ; eyes and frons brown ; antennal shaft black above, very minutely checkered white below ; club with small yellow tip.

The following small points may be noted :

On fore wing above the blue spot in space 2 is narrower and the spots in 4, 5 and 6 are longer ; in hind wing the distal border is narrower, especially at anal angle. Below the postdiscal pale spots on fore wing are longer and more distinct, especially in 2 and 3. Otherwise as in the typical race.

Neallotype ♂. UGANDA : Bwamba, iv.1942. T. H. E. Jackson.

Seen flying rapidly across the open, between trees on an open hillside at Katera, Buddu about 11 a.m. ; the females laying on lichen-covered, ant-infested tree trunks later in the day.

Recorded from : UGANDA : Katera, Kayonza, Kigezi and Bwamba, Sesse Islands, Lutoboka, Bugalla Island, Siroko River near Mt. Elgon.

Epitola decellei Stempffer

♂ *Epitola decellei* Stempffer, 1956 : 30, fig. 16, genitalia pl. 2, figs. 11, 12.
Type. CONGO : Stanleyville, Yangambi. (M.R.C.B., Tervuren.)

♀. Unknown.

Recorded only from the type locality.

***Epitola stempfferi* sp. n.**

(Pl. 13, figs. 122, 123, 128, 129)

♂ and ♀. Closely allied to *hewitsoni* Mabille and *decellei* Stempffer, and of the same shape.

Legs dark sepia, unspotted ; palps dark brown above and below ; frons and eyes dark brown ; antennal shaft black above, checkered white below ; club black.

♂. *Upperside fore wing :* black with brilliant greenish blue basal and discal areas ; costal border black up to the upper median and thereafter linear to the apical patch ; apex and margin broadly black ; blue area extends from inner margin to upper median, covering 1 and 2 to within 4 mm. of distal margin, the bases of 3, 4 and 5 and the whole of the cell ; thereafter three blue streaks postdiscal in 7, 8 and 9 and two small blue spots in 5 and 6 ; large V-shaped wedge of black ground colour invading the blue area above apex of cell.

Upperside hind wing : black with blue basal discal patch from veins 1–7 with a blue streak in the base of space 8 ; distal margin of this patch irregular leaving a broad black distal border 5 mm. wide on vein 5 and 3 mm. wide on vein 2 ; space 1*b* black throughout.

Underside fore wing : smoky brown with lighter patch along inner margin nearly to vein 2 and a series of small obscure whitish subapical spots placed obliquely in spaces 5–7 ; a slightly paler submarginal area between veins 3–5.

Underside hind wing : clear brownish violet with black or brown spots and markings ; three small black sub-basal spots, the first just below 8, the second in the cell and the third between vein 2 and the lower median ; five rounded black discal spots, the first below vein 8, the second and third confluent and in the cell, the fourth between vein 2 and the lower median, and the fifth between 2 and 1*b* ; a black spot on the lower discocellular ; a small, triangular black spot between the lower median and the origin of vein 2 ; a fine, very irregular postdiscal black line running between 6 and 2 ; a series of large confluent, submarginal brown spots, forming a broad band, nearly continuous from apex to anal angle.

This species may be distinguished at once, in the male, from its nearest neighbours, *decellei* Stempffer and *hewitsoni* Mabille by the much broader black border in hind wing and by the invasion of the blue band in fore wing by a wedge of the black ground colour.

It is worthy of note that both the above are female characters and this is the only species known with such characters in the male.

♀. *Upperside fore wing :* brown with blue patch from base to beyond the middle, bounded along the costa by the subcostal vein and reaching the inner margin. Distally covering the base of spaces 4, 5 and 6, projecting sharply distad in 2 and 3 and again in 1 and 1*a*. A series of small blue postdiscal spots in 5, 6 and 7.

Upperside hind wing : brown with large blue patch reaching to within 2 mm. of the margin in 1 and 3 and gradually receding to 6 mm. on vein 6. Bounded costally by vein 6 but with a few blue scales in the base of space 6 above it. The distal margin of the blue area very dislegnic.

Underside : exactly as in the male but with larger postdiscal spots in fore wing.

Length of fore wing : ♂ 24 mm., ♀ 27 mm.

Holotype ♂. GABOON : Douano. 27.ix.1951. P. Rougeot leg. Coll. Stempffer.

Allotype ♀. FR. EQUAT. AFRICA : Ouesso, Ketta Forest. vii.1959. T. H. E. Jackson.

Recorded from : GABOON : Douano ; FR. EQUAT. AFRICA : Ouesso ; CONGO : Buta Dist., Yopole.

This species is named in honour of Monsieur H. Stempffer of Paris.

THE *POSTHUMUS* GROUP

Epitola posthumus (Fabricius)

♂ *Papilio posthumus* Fabricius, 1793 : 149.
Type. Missing.
Epitola posthumus (Fabricius) ; Seitz, 1920 : pl. 64, *e*.
♀ *Epitola belli* Hewitson, 1874 : 382.

Recorded from : NIGERIA ; BR. CAMEROONS ; FR. CAMEROONS ; GHANA ; FR. EQUAT. AFRICA ; CONGO ; UGANDA.

Epitola urania urania Kirby

(Pl. 1, fig. 3, Pl. 2, fig. 12, Pl. 9, fig. 85, Pl. 10, fig. 95)

♂ *Epitola urania* Kirby, 1887 : 441.
Type. CAMEROONS.

♀. Legs black with small pale brown lines at joints ; palps black above and below, with a small white spot above ; frons black with white edges ; eyes black ; antennal shaft black above and below ; club yellow-tipped below.

Upperside fore wing : black with blue basal and discal area bounded by the subcostal and reaching the inner margin, distally covering the base of spaces 4, 5 and 6 for 5 mm.; projecting distad in 3 and 2 and to within 3 mm. of the margin in 1, and 4 mm. in 1*a*. Small blue spots half-way along the costa in 7 and 8 and streaks in 9 and 10.

Upperside hind wing : black with large blue discal patch reaching to the base and bounded by veins 1 and 7. A wide black border distally, 7 mm. on vein 6 but becoming narrower towards the anal angle, where the blue colour almost reaches the margin.

Underside : as in the male.

Length of fore wing : 35 mm.

Neallotype ♀. CAMEROONS : Suffert bequest.

Recorded from : SIERRA LEONE ; IVORY COAST ; LIBERIA ; NIGERIA ; GABOON ; FR. EQUAT. AFRICA.

Epitola urania tanganikensis Joicey & Talbot

(Pl. 1, fig. 4, Pl. 2, fig. 13)

♂ *Epitola urania tanganikensis* Joicey & Talbot, 1921 : 86, pl. 14, fig. 63.
Type. BELGIAN CONGO : Albertville.

♀. Legs, eyes, etc. as in the typical race, but antennal shaft checkered white below.

Agrees with the description of the male, *loc. cit.*, except for the presence of a costal spot, in 7 and the reduction of the blue area in hind wing, as in the typical female.

Neallotype ♀. UGANDA : Toro, Kibale Forest, ii.1951. T. H. E. Jackson.

Males observed flying, briefly, high up in Kibale Forest, Toro, and settling on creeper tendrils ; females laying on tree trunks among *Crematogaster* ants.

Recorded from : CONGO : Albertville, Katanga ; UGANDA : Bwamba and Toro.

Epitola crowleyi crowleyi Sharpe

♂, ♀ *Epitola crowleyi* Sharpe, 1890 : 106.
Types. SIERRA LEONE.
♂, ♀ *Epitola crowleyi* Sharpe ; Seitz, 1920 : pl. 64, *e*.

Recorded from : SIERRA LEONE ; NIGERIA ; CAMEROONS ; FR. EQUAT. AFRICA ; GHANA ; CONGO ; UGANDA.

Epitola semibrunnea Baker

♂ *Epitola crowleyi* var. *semibrunnea* Baker, 1916 : 378.
Type. CAMEROONS.
♀ *Epitola ammon* Joicey & Talbot, 1921 : 83, pl. 14, figs. 60, 61.
Type. CONGO : Penghe, North bank, Ituri River.

Only the types are known to the author.

Epitola ceraunia Hewitson

♂ *Epitola ceraunia* Hewitson, 1879 : 149.
Type. WEST AFRICA (Rutherford).
Epitola ceraunia Hewitson ; Seitz, 1920 : pl. 64, *e*.
♀ *Epitola dewitzi* Kirby, 1887 : 442.
Type. CAMEROONS. Bred.

Recorded from : SIERRA LEONE ; IVORY COAST ; LIBERIA ; TOGO ; GHANA ; NIGERIA ; BR. CAMEROONS ; FR. CAMEROONS ; FR. EQUAT. AFRICA ; CONGO ; UGANDA.

Epitola adolphifriderici Schultze

♂, ♀ ***Epitola adolphi friderici*** Schultze, 1911 : 95.
Epitola adolphifriderici Schultze ; Seitz, 1920 : pl. 65, *b*.
Types. SOUTH CAMEROONS : Yukaduma. (Coll. Senckenberg.)

THE *CARCINA* AND *NITIDE* GROUPS

A. ♀♀. Brown with large white discal patch in fore wing.

Epitola marginata marginata Kirby

♂ ***Epitola marginata*** Kirby, 1887 : 443.
Type. CAMEROONS.
Epitola marginata Kirby ; Grose-Smith & Kirby, i. 1889 : *Lyc. Afr.* pl. 7, figs. 5, 6.
♀ ***Epitola marginata*** Kirby ; Joicey & Talbot, 1921 : 85, pl. 14, figs. 56, 57.
Type. CONGO : Albertville.

Recorded from : CAMEROONS : Bitje, Johann Albrechts Höhe ; NIGERIA : Pt. Harcourt and Bassa Prov. ; FR. EQUAT. AFRICA : Ketta and Mambili ; CONGO : Albertville ; UGANDA : Kigezi, Kayonza.

Epitola marginata umbratilis Holland

Epitola umbratilis Holland, 1890 : 425.
Type. GABON : " Upper waters of the River Ogove." (Carnegie Mus., Pittsburg.)

This subspecies is probably a synonym of *marginata* Kirby.
Recorded from : CAMEROONS : Yukaduma, Barombi.

Epitola moyambina Baker

(Pl. 1, fig. 5, Pl. 2, fig. 14)

♂ ***Epitola moyambina*** Baker, 1903 : 330.
Type. SIERRA LEONE : Moyamba.

♀ Very similar to the females of *cercene* Hewitson, *convexa* Roche and *intermedia* Roche, and about the same size.

Legs dark brown with white spots at joints ; palps brown, black-tipped with whitish lateral spots ; frons brown with white edges ; eyes brown ; antennal shaft black above, checkered white below ; club orange-tipped.

Upperside fore wing : black-brown with white postdiscal band and basal areas blue. Cell, half space 1 and the extreme base of 2 blue. A large triangular spot of the black ground colour invading the discal area with apex half-way along the discocellular. Postdiscal white band from 1–7, its distal edge nearly straight from veins 2–7, and sharply toothed in space 2. A small kink basad on vein 7 and narrowing abruptly in space 1. The almost straight distal margin of the white band distinguishes it from the other members of this group. In specimens from Sierra Leone this band is broader.

Upperside hind wing : dark grey-brown, immaculate.

Underside fore wing : ground colour brown-grey, the white postdiscal band reproduced as above but reaching the costa and becoming pale yellow from space 3 to the costa. Grey submarginal and marginal lines as in the male.

Underside hind wing : brown-grey with markings as in the male.

Length of fore wing : 20 mm.

Neallotype ♀. NIGERIA : Lagos Dist., Oshodi. iv.1955. T. H. E. Jackson.
Recorded from: SIERRA LEONE ; IVORY COAST ; NIGERIA ; GHANA : Ashanti.

Epitola cercene Hewitson

♂ ***Epitola cercene*** Hewitson, 1873 : 150.
Type. ANGOLA.
Epitola cercene Hewitson ; Seitz, 1920 : pl. 65, *f*.
♀ *Epitola versicolor* Kirby, 1887 : 444 (**syn. n.**).
Type. CAMEROONS.

Recorded from : W. AFRICA to UGANDA and ANGOLA.

Epitola intermedia Roche

(Pl. 1, fig. 6, Pl. 2, fig. 15)

♂ ***Epitola intermedia*** Roche, 1954 : 496, pl. 20, figs. 11, 12.
Type. UGANDA : Katera.

♀. Similar to *moyambina* Bethune-Baker and to *cercene* Hewitson, but distal edge of fore wing white patch more or less rounded and underside different. Legs light brown with lighter joints ; palps light brown above and below ; frons light brown with white edges ; eyes brown ; antennal shaft black above, checkered minutely white below ; club orange-tipped.

Upperside fore wing : black-brown ; cell and basal third of space 1 brown with sparse blue scales. A broad white postdiscal band with rounded distal edge, just invading the cell proximad. A small triangular patch on the discocellular. The white band is slightly dentate in 2 and 3, but thereafter rounded and even to vein 9. This band stretches from 1*a*–9, as in *cercene*.

Upperside hind wing : dark grey-brown ; immaculate.

Underside fore wing : very pale brownish grey with white band as above, but slightly yellowish near the costa markings in apical area faint.

Underside hind wing : very pale brownish grey with markings as in the male.

Length of fore wing ; 18 mm.

Neallotype ♀. UGANDA : Katera. ix.1949. T. H. E. Jackson.
Recorded from : UGANDA : Katera and Budongo.

Epitola convexa Roche

(Pl. 1, fig. 7, Pl. 2, fig. 16)

♂ ***Epitola convexa*** Roche, 1954 : 496, pl. 20, figs. 11, 12.
Type. UGANDA : Bwamba.

♀. Very similar to the females of *moyambina* Baker, *cercene* Hewitson and *intermedia* Roche. Legs brown, heavily scaled whitish ; palps light brown above and below ; eyes brown ; frons brown edged whitish ; antennal shaft black above, checkered white below ; club yellow-tipped.

Upperside fore wing : black-brown ; basal area of 1 and cell brown with blue scales, more blue than in *intermedia* but less than in *cercene* and *moyambina*. A triangular black spot on the discocellular, longer and more pointed than in the other species and reaching almost to the lower angle of the cell. Broad white postdiscal band, double-toothed in space 2, thereafter narrowing in squared steps between 3, 4 and 5, and 6–9, stretching from veins 1*a*–9.

Upperside hind wing : dark grey-brown ; immaculate.

Underside fore wing : scarcely differs from *cercene* Hewitson, except for the slightly different distal margin of the white band. Submarginal and marginal lines as in male.

Underside hind wing : grey-brown, with markings as in the male.

Length of fore wing ; 21 mm.

Neallotype ♀. UGANDA : Unyoro, Budongo Forest. viii.1957. T. H. E. Jackson.

Recorded from : FR. EQUAT. AFRICA : Etoumbi and Ouesso ; UGANDA : Bwamba, Budongo and Mpigi.

Epitola cercenoides Holland

♂ *Epitola cercenoides* Holland, 1890 : 424.
Type. GABOON : " Upper waters of the River Ogove." (Carnegie Mus., Pittsburg.)
♀ *Epitola batesi* Druce, 1910 : 365, pl. 34, figs. 2, 3.
Type. CAMEROONS : Bitje.
♂, ♀ *Epitola batesi* Druce ; Seitz, 1920 : pl. 64, *h*.

Recorded from : WEST AFRICA to UGANDA.

Epitola uniformis Kirby

(Pl. 1, fig. 8, Pl. 2, fig. 17)

♂ *Epitola uniformis* Kirby, 1887 : 445.
Type. NIGERIA : Lagos.
Epitola uniformis Kirby ; Seitz, 1920 : pl. 64, *h*.
♀ *Epitola versicolor* Kirby, 1887 : 444. (Described as the male.)
Epitola leonina Staudinger ; Seitz, 1920 : 355.

♀. There has been considerable confusion in the past over the females of *uniformis* Kirby, *leonina* Staudinger and *zelza* Hewitson. The female described by Kirby, *loc. cit.* and figured in Seitz, 64, *h*, is the female of *zelza* Hewitson. Similarly, the female ascribed by Aurivillius in Seitz, p. 355, to *leonina* Staudinger is the female of *uniformis* Kirby. The following evidence is considered conclusive.

1. An examination of the underside of *leonina* Staudinger shows that it belongs to the group containing *zelza* Hewitson, *tumentia* H. Druce, *badura* Kirby and *nigrovenata* sp. n. *All* the females of this group are brown with blue discal areas. It seems probable, therefore, that the female of *leonina* will be similar. Further, in the eastern Congo and extreme west of Uganda (Bwamba) *leonina* flies with a blue female and in the west a similar female is found in the same areas as the male.

2. If the above is correct then the black and white female must belong to *uniformis* and it is significant that this female occurs in all localities cited for the male. The only alternative to this is that this black and white female is merely a variety of *cercenoides* Holland with blue scaling covering the disc of the hind wing, an unlikely hypothesis, since it would leave *uniformis*, a comparatively common species, without a known female of any sort. On average, also, the females with the blue discal area in hind wing, are smaller than those of *cercenoides*.

This insect was described by Aurivillius in Seitz, under the name *leonina* Staudinger, but a fuller description is given below :

♀. Nearest to *cercenoides* Holland, but with blue discal area in hind wing.

Legs dark brown with paler joints ; palps dark brown above and below, also eyes and frons ; antennal shaft black above, checkered below ; club orange-tipped.

Upperside fore wing : black-brown ; cell and extreme base of 1 blue ; a large black triangular spot on the discocellular ; broad white postdiscal band not invading the cell and with evenly curved distal edge, becoming yellowish towards the costa and stretching from veins 1*a* to 9. Slight indentations in 2 and 3 but less so than in *cercenoides*.

Upperside hind wing : dark brown ; a blue patch covering the basal two-thirds of the cell, the extreme base of space 3 and the basal third of 1. This blue area is variable ; it may extend over the whole cell and beyond or be reduced to some scattered blue scales, but is present in all specimens before me.

Underside fore wing : grey-brown ; the postdiscal band strongly yellow from vein 1 to the costa ; apical markings prominent as in male. Basal grey-brown area distally V-shaped in which it differs from *cercenoides*.

Underside hind wing : grey-brown with prominent lines as in male.

Length of fore wing : 16 mm.

Neallotype ♀. FR. EQUAT. AFRICA : Ouesso, Ketta Forest. ix.1959. T. H. E. Jackson.

Recorded from : SIERRA LEONE ; IVORY COAST ; NIGERIA ; GHANA ; GABOON ; FR. EQUAT. AFRICA ; CONGO ; N. ANGOLA.

Epitola dorothea Baker

(Pl. 9, fig. 87, Pl. 10, fig. 97)

♂, ♀ *Epitola dorothea* Baker, 1904 : 227.
Type. SIERRA LEONE.

Recorded from : SIERRA LEONE : Moyamba, Mabangi ; IVORY COAST : Guiglo ; GHANA : KUMASI.

Epitola insulana Aurivillius

(Pl. 1, fig. 9, Pl. 2, fig. 18, Pl. 9, fig. 88, Pl. 10, fig. 98)

♂ *Epitola insulana* Aurivillius, 1923 : 1203.
Type. FERNADO PO : San Carlos. (Riksmuseum, Stockholm.)

♀. Legs and palps below pale brown, heavily dusted with grey scales ; palps above darker brown ; frons light brown laterally fringed with white ; eyes dark brown ; antennal shaft dark brown above, below minutely checkered white ; club orange-tipped.

Upperside : nearest to *cercene* Hewitson and *cercenoides* Holland but differs from both in the bright blue basal area fore wing.

Upperside fore wing : black ; broad white postdiscal band from 2–7 broadest in space 2, 8 mm., where it almost reaches the margin, slightly invading space 1 at the distal end and narrowest, 2 mm., in space 6, proximally this band is straight from vein 7 to the origin of vein 3 and then bent distad, running almost along vein 2 ; whole basal area bright blue ; extending in space 1 to within 2 mm. of the margin, small triangular black spot, at junction between white and blue areas arising from vein 7.

Upperside hind wing : plain dark brown.

Underside fore wing : pale brown with white band of upperside showing through, but extending to space 1, proximal edge, therefore, straight throughout ; a few faint paler markings in apex.

Underside hind wing : pale brown, with very faint traces of submarginal and postdiscal lines.
Length of fore wing : 17 mm.

Neallotype ♀. FERNANDO PO : 3,000–4,000 ft., vi.1926. T. A. Barns. Joicey Bequest.

Known only from Fernando Po.

An outlying member of this group is *Epitola katherinae* Poulton, in which the female is similar, but the light patch in fore wing is orange.

Epitola katherinae Poulton

♂, ♀ *Epitola katherinae* Poulton, 1929 : 494, pl. 30, figs. 5, 7.
Type. NIGERIA : Ibadan. (Hope Dept., Oxford.)

Recorded from : NIGERIA : Oshodi and Ibadan.

The following species probably belongs here :

Epitola carilla Roche

♂ *Epitola carilla* Roche, 1954 : 495, pl. 20, figs. 13, 14.
Type. UGANDA : Entebbe.

♀ unknown.

Known only from the type.

B. ♀♀ brown with large blue discal areas in both wings, but no postdiscal white line or blue spots ; occasionally the blue area in fore wing is distally white.

Epitola staudingeri staudingeri Kirby

(Pl. 3, fig. 19, Pl. 4, fig. 29)

♂ *Epitola staudingeri* Kirby, 1890 : 271.
Type. SIERRA LEONE. (Staudinger Coll.)
Epitola staudingeri Kirby ; Seitz, 1920 : pl. 65, *d*.

♀. Legs dark brown, with much lighter scaling at the joints ; palps light brown with whitish lateral edges ; antennal shaft, black above, checkered white below ; club tipped bright orange.

Upperside fore wing : dark brown, with dull blue basal area from inner margin to upper median vein covering the cell, but not extending beyond it ; distally very irregular and arranged as follows : a long sharply pointed streak in 5, extending half-way along the cellule ; a very small spot in the base of 4 ; a streak in 3, 5 mm.; the whole of 1 and 2 almost to the margin.

Upperside hind wing : dark brown ; discal and basal dull blue patch from veins 1–6, not sharply defined distally ; a broad dark brown border 2–3 mm. but containing scattered blue scales ; costal border dark brown.

Underside : clay coloured, slightly paler along inner margin of fore wing ; faint traces of two submarginal crenulate lines on both wings, otherwise unmarked.

Length of fore wing : 20 mm.

Neallotype ♀. SIERRA LEONE : Baudàjuma, No. 1898. G. I. Arnold.

Recorded from : SIERRA LEONE and NIGERIA.

Epitola staudingeri gordoni Druce

♂ *Epitola gordoni* Druce, 1903 : 70.
Type. NIGERIA : Bonny. (Hope Dept., Oxford.)

♀ unknown.

The type has been examined in Hope Department, Oxford. The underside markings, mentioned by Druce are present to a greater or lesser degree in the series in British Museum (Nat. Hist.) and *gordoni* should be considered a synonym of *staudingeri* Kirby.

Epitola staudingeri aequatorialis ssp. n.

(Pl. 13, figs. 120, 121, 126, 127)

This subspecies occurs in French Equatorial Africa, i.e. in the zone usually referred to as Gaboon. It differs from the typical race in the female, which is brown, unmarked, thus linking it with *concepcion* Suffert and *elissa* Grose-Smith.

♂. Does not differ either above or below from the typical race.

♀. *Upperside :* dark brown, unmarked.

Underside : pale warm brown ; traces of paler postdiscal spots in fore wing and of submarginal and postdiscal crenulate lines in hind wing.

Length of fore wing : 18 mm.

Holotype ♀. FR. EQUAT. AFRICA : Moyen Congo, Etoumbi. ix.1960. T. H. E. Jackson.

Allotype ♂. Same data as holotype.

Recorded from : GABOON and FR. EQUAT. AFRICA.

Epitola mara Talbot (**stat. n.**)

(Pl. 3, fig. 20, Pl. 4, fig. 30)

♂ *Epitola staudingeri mara* Talbot, 1935 : 75.
Type. VICT. NYANZA : Nr. Kakindu. (Hope Dept., Oxford.)
♂ *Epitola jacksoni* Roche, 1954 : 496, pl. 20, figs. 15, 16 (**syn. n.**).
Type. Uganda : Katera.

The type of *staudingeri mara* has been examined in Hope Department, Oxford and found to be identical with the species described by Roche (1954 : 496) under the name of *Epitola jacksoni* which name sinks as a synonym. The present author however, agrees with Roche that *mara* Talbot is not a ssp. of *staudingeri* Kirby.

♀. Frons, legs, palps light brown ; eyes black ; antennal shaft brown ; club black above with pale brown tip, brown below.

Upperside fore wing : dark brown ; scattered blue scales throughout cell, extended in a streak along vein 5 for about half its length ; half of cellule 2 and the whole of 1, up to 2 mm. of the margin.

Upperside hind wing : dark brown with basal blue patch extending from vein 1 to vein 6, covering the whole of the cell, and distad to within 5 mm. of the margin. The distal margin of the blue patch, however, fades out into the ground colour, without any clearly defined boundary.

Underside : pale clay coloured on both wings with traces of the postdiscal silvery spots, especially the large one on the inner margin ; no other markings.

Length of fore wing : 20 mm.

Neallotype ♀. UGANDA: Masaka, Sango Bay, Katera. xi.1955. T. H. E. Jackson.

This species flies high in and under the canopy and can only be taken by building a platform in a suitable place; the males fly later than most *Epitola* and are still moving up to 1 p.m. The females come down to lay on dead twigs, etc.

Recorded only from: UGANDA: Masaka Dist., Sango Bay, Katera and Kakindu.

Epitola leonina Staudinger

(Pl. 3, fig. 21, Pl. 4, fig. 31)

♂ *Epitola leonina* Staudinger, 1888 : 268.
Type. SIERRA LEONE. (Staudinger Coll.)
Epitola leonina Staudinger; Seitz, 1920: pl. 65, *e*.
Epitola ciconia Grose-Smith & Kirby, 1892 : *Afr. Lyc.* pl. 17, figs., 5, 6. (See Aurivillius, 1898).

The female described in Seitz (1920 : 355) as *E. leonina* is the female of *uniformis* Kirby (see explanation under that species); the correct female is described below:

♀. Legs dark brown, lighter at the joints; eyes black; palps dark brown; frons grey-brown; antennal shaft brown above, checkered white below; club black with light brown tip.

Upperside fore wing: black-brown; a basal blue patch extending from the inner margin to vein 5 and covering the cell except for a streak in the upper angle. The distal edge is broadly dentate and includes almost the whole of space 1, half 2 and 3 mm. of 3 and 4; a fine black line along the discocellular as in the male; veins black.

Upperside hind wing: black-brown with blue patch from veins 1–6, extending within 3–4 mm. of the margin; veins black.

Underside: grey-brown; markings as in the male but more prominent, especially the discal and postdiscal lines.

Length of fore wing 19 mm.

Neallotype ♀. NIGERIA: Calabar Prov., Okarara, iii.1958. T. H. E. Jackson.

Recorded from: SIERRA LEONE; NIGERIA: Okarara and Ikom; BR. CAMEROONS: Mamfe; FR. CAMEROONS: Bitje; FR. EQUAT. AFRICA: Etoumbi; UGANDA: Bwamba.

Epitola badura Kirby

♂ *Epitola badura* Kirby, 1890 : 271.
Type. CAMEROONS. (Missing.)
Epitola badwia [*sic*] Kirby; Seitz, 1920: pl. 64, *g*.
♀ *Epitola badura* Kirby; Aurivillius in Seitz, 1920 : 355.

Recorded from: CAMEROONS: Barombi, Bitje, Johann Albrechts Höhe; FR. EQUAT. AFRICA: Etoumbi; CONGO: Irumu, Beni; UGANDA: Bwamba.

Epitola nigrovenata **sp. n.**

(Pl. 3, figs. 22, 23, Pl. 4, figs. 32, 33)

This species belongs to the subgroup of *leonina* Staudinger and *badura* Kirby.

♂, ♀. Legs dark brown, spotted with whitish yellow at the joints; palps, eyes and frons dark brown. Antennal shaft black above, minutely checkered white below; club orange-tipped.

♂. *Upperside fore wing:* black with blue basal and discal area from inner margin to and including the cell; distal edge of this sharply and deeply indented and broken into spots by black along the veins; veins 2, 3 and 4, the lower median and discocellular all broadly black; along the inner margin in spaces 1 and 2 the blue colour reaches within ½ mm. of the margin.

Upperside hind wing : blue from veins 1–5 from base to margin, only the fringes black ; beyond this black to costa ; vein 4 and the median blackened.

Underside fore wing : dark brownish grey ; obscure silvery submarginal lines becoming prominent at inner angle ; fine, silvery subapical and postdiscal lines enclosing a darker band of the ground colour ; a few silvery spots in cell.

Underside hind wing : dark brownish grey with traces of five silvery lines. This underside pattern is typical of all members of the subgroup.

♀ *Upperside fore wing :* black with blue area as in male, differing in extent only in the cell, where the basal two-thirds is black ; veins blackened as in male, but finer.

Upperside hind wing : black ; blue basal area restricted, leaving a broad black border 1 mm. wide at anal angle and 4 mm. on vein 5 ; distal edge not sharply delineated ; vein 4 and the median blackened.

Underside : as in the male but all lines and markings more prominent.

Length of fore wing : ♂ 23 mm., ♀ 24 mm.

Holotype ♂. S. NIGERIA : Oban, ii.1921. Cator Coll.

Allotype ♀. FR. EQUAT. AFRICA : Moyen Congo, Etoumbi, iii.1959. T. H. E. Jackson.

Recorded only from the two localities mentioned above.

Epitola tumentia Druce

(Pl. 3, fig. 24, Pl. 4, fig. 34)

♂ ***Epitola tumentia*** Druce, 1910 : 366, pl. 33, fig. 15.
Type. NIGERIA : Afikpo.
Epitola tumentia Druce ; Seitz, 1920 : pl. 64, *g*.

♀. Very similar to the female of *leonina* Staudinger. Legs dark brown with paler joints ; palps dark brown ; eyes black ; frons grey-brown ; antennal shaft black above, finely checkered black and white below ; club black with orange tip.

Upperside fore wing : black-brown with blue basal patch extending almost as in *leonina*, but slightly restricted in space 4 ; veins not or little blackened ; black discocellular streak finer.

Upperside hind wing : black-brown with blue basal patch from veins 1–6 ; distal edge ill-defined ; margin 1 mm. at vein 1 and 3 mm. at vein 6 ; veins not blackened.

Underside : as in the male ; differs from *leonina* Staudinger in the greyer, less brown, ground colour and in the thick silvery conjoined double submarginal lines in both wings. Length of fore wing : 18 mm.

Neallotype ♀. FR. EQUAT. AFRICA : Moyen Congo, Etoumbi. xii.1958. T. H. E. Jackson.

Recorded from : NIGERIA : Mamu, Awka Dist., and Uwet ; FR. EQUAT. AFRICA : Ouesso and Etoumbi.

Epitola zelza Hewitson

(Pl. 9, fig. 84, Pl. 10, fig. 94)

♂ ***Epitola zelza*** Hewitson, 1873 : 151.
Type. NIGERIA : Old Calabar.
Epitola zelza Hewitson ; Seitz, 1920 : pl. 65, *e*.
Epitola badia Kirby, 1887 : 444.
Type. CAMEROONS.
♀ ***Epitola uniformis*** Kirby ; Seitz, 1920 : pl. 64, *h*.

♀ figured in Seitz, pl. 64, *h*, as *uniformis* Kirby and described under that species. A redescription is given below of the male ; cf. Aurivillius in Seitz, who states that this species was described from a damaged specimen and borne out by the figure, which is totally incorrect. This figure is but a copy of Hewitson's figure in *Ill. Diurn. Lep. Suppl.* pl. 1*b*, figs. 15, 16.

♂. Legs brown with paler joints; palps mouse-brown; eyes black; frons black-brown; antennal shaft black above, finely checkered white below; club black with pale brown tip.

Upperside fore wing: black with bright blue basal patch from inner margin to vein 7; distal edge evenly curved but dentate, reaches almost to margin in 1; costa broadly black; median vein swollen at base.

Upperside hind wing: blue from vein 1 nearly to 7, with narrow black distal margin.

Underside fore wing: mouse-grey with faint but distinct dentate lines, two submarginal, one postdiscal, one shorter, across end of cell; some faint spots in cell.

Underside hind wing: mouse-grey with five pale dentate lines; two submarginal, one postdiscal, one across end of cell, one very faint across cell.

Length of fore wing: 15 mm.

Recorded from: NIGERIA: Mamu, Awka, Udi, Eket, Oban and Uwet; FR. EQUAT. AFRICA: Etoumbi and Ouesso; CONGO: Lowa Valley.

Epitola gerina Hewitson

♂ *Epitola gerina* Hewitson, 1878: 19, pl. 1*b*, figs. 13, 14.
Type. CONGO.
Epitola gerina Hewitson; Seitz, 1920: pl. 65, *b*.
♀ *Epitola goodii* Holland, 1890: 24.
Type. GABOON: "Upper waters of the River Ogove." (Carnegie Mus., Pittsburg.)
♀ *Epitola zelica* Kirby, 1890: 272.
Type. CAMEROONS: Barombi.

Epitola daveyi Roche

♂, ♀ *Epitola daveyi* Roche, 1954: 499, pl. 20, figs. 19, 29 ♂; figs. 21, 22 ♀.
Type. SE. NIGERIA: Isoba.

Known only from the types.

Epitola albomaculata Baker

♂ *Epitola albomaculata* Baker, 1903: 329.
Type. SIERRA LEONE.
Epitola albomaculata Baker; Seitz, 1920: pl. 65, *e*.
♀ *Epitola albomaculata* Baker, 1904: 230.

Recorded from: SIERRA LEONE: Moyamba; NIGERIA: Warri.

Epitola liana Roche

(Pl. 13, figs. 119, 125)

♂ *Epitola liana* Roche, 1954: 500, pl. 21, figs. 23, 24.
Type. UGANDA: Bwamba.

♀. Legs white; palps white with black tips, frons white; eyes brown; antennal shaft black above; finely checkered white below.

Upperside fore wing: black with dark blue basal area from the upper median to inner margin and extending distad as follows: upper half of cell and space 4 white to within 3 mm. of margin; base of spaces 2 and 3 blue and a large white spot mid-way in 2; space 1 blue, distally white to within 2 mm. of margin. A small black streak on the discocellular.

Upperside hind wing : dark grey ; blue basal patch from veins 1–6, covering half space 2 and the bases of 3–6 ; a large whitish spot mid-way in 5 and 6 and space 8 whitish ; a fine black streak on the discocellular ; fine black marginal line and fringes checkered.

Underside : as in the male, but white ground colour more prominent.

Length of fore wing : 15 mm.

Neallotype ♀. UGANDA : Masaka, Sango Bay, Katera. viii.1960. T. H. E. Jackson.

Recorded from : UGANDA : Budongo, Katera and Bwamba.

Epitola nitide Druce

♂ *Epitola nitide* Druce, 1910 : 336, pl. 34, fig. 1.
Type. CAMEROONS : Bitje, Ja River.
Epitola nitida [*sic*] Druce ; Seitz, 1920 : 356.
♀ *Epitola subalba* Baker, 1915 : 190.
Type. CAMEROONS : Bitje.
Epitola nitide Druce ; Dufrane, 1953 : 50 [Redescription].

Recorded from : GHANA : Ho, Kapandu ; CAMEROONS : Bitje ; FR. EQUAT. AFRICA : Kelle ; UGANDA : Mukono, Katera.

Epitola virginea Baker

♀ *Epitola virginea* Baker, 1904 : 230.
Type. SIERRA LEONE.
♂ *Epitola virginea* Baker ; Roche, 1954 : 501, pl. 20, figs. 17, 18.
Allotype ♂. SIERRA LEONE : Daru.

Recorded from : SIERRA LEONE : Moyamba, Daru ; GHANA : Kumasi.

C. ♀♀. Plain brown above.

Epitola concepcion Suffert

♀ *Epitola concepcion* Suffert, 1904 : 54.
Type. CAMEROONS : Barombi (Berlin Mus.).
Epitola concepcion Suffert ; Seitz, 1920 : pl. 65, *a*.
♂ *Epitola concepcion* Suffert ; Aurivillius, 1923 : 1199.
Allotype, S. CAMEROONS : Molundu.

There are no specimens of this species in the British Museum (Nat. Hist.) or in the author's collection.

Epitola elissa Grose-Smith

(Pl. 3, fig. 25 ; Pl. 4, fig. 35)

♂ *Epitola elissa* Grose-Smith, 1898 : 354.
Type. NIGERIA : Warri.
Epitola oniensis Baker, 1913 : 501.
Type. NIGERIA : Oni near Lagos. (Hope Dept., Oxford.)

♀. Legs brown with paler joints, almost checkered ; palps pale brown with black tips ; eyes black ; frons dark brown ; antennal shaft dark brown above, checkered below ; club yellow-tipped.

Upperside : plain dark brown in both wings ; no markings.

Underside fore wing : warm brown ; two faint dentate submarginal lines ; a stronger postdiscal crescentric line from costa to vein 2 ; no other marks ; space 1 pale grey.

Underside hind wing : warm brown ; traces of four-dentate lines all distad of the cell and broken into spots. Both wings with fine dark margins.

Length of fore wing : 15 mm.

Neallotype ♀. NIGERIA : Ogoja Prov., Ikom. ii.1956. T. H. E. Jackson.

Recorded from : SIERRA LEONE : Moyamba ; NIGERIA : Ikom and Warri ; BR. CAMEROONS : Mamfe.

Epitola ikoya Roche

♂, ♀ *Epitola ikoya* Roche, 1954 : 497, pl. 19, figs. 5–6 ♂ ; 7, 8 ♀.
Type. NIGERIA : Lagos.

Recorded from : NIGERIA : Oshodi, Mamu Forest, Ubiaja.

D. ♀♀. Brown with blue discal areas in both wings and a series of white postdiscal spots, fore wing.

Epitola congoana Aurivillius

♂, ♀ *Epitola congoana* Aurivillius, 1923 : 1201.
Type. CONGO : Kimuenza. (Riksmuseum Stockholm.)

Recorded from : NIGERIA : Oshodi and Ubiaja ; CONGO : Kimuenza.

Epitola flavoantennata Roche

♂, ♀ *Epitola flavoantennata* Roche, 1954 : 495, pl. 19, figs. 1, 2 ♂ ; 3, 4 ♀.
Type. CAMEROONS : Bitje, Ja River. Taken *in cop.*

Recorded from : CAMEROONS : Bitje ; FR. EQUAT. AFRICA : Ketta and Mambili ; CONGO : Beni and Lubilinga Valley, Lubutu.

Epitola carcina Hewitson

♀ *Epitola carcina* Hewitson, 1873 : 150.
Type. NIGERIA : Old Calabar.
♂, ♀ *Epitola kholifa* Baker, 1904 : 229.
Type. SIERRA LEONE.
♂, ♀ *Epitola carcina* Hewitson ; Aurivillius in Seitz, 1920 : 353, pl, 65, *d*.
♀ *Epitola entebbeana* Baker, 1926 : 392.
Allotype. NIGERIA : Oban.

***Epitola coerulea* sp. n.**

(Pl. 3, figs. 26, 27, Pl. 4, figs. 36, 37)

Nearest to *carcina* Hewitson.

♂. Legs very dark brown with small pale bands at the joints ; palps dark grey-brown above and below ; frons dark brown ; eyes rather browner than in other species ; antennal shaft black above, checkered black and white below ; club with orange tip.

Upperside fore wing : black with shining azure blue basal patch, much brighter and more extended than in *carcina* ; blue colour extends from inner margin to vein 7, filling half spaces 5 and 6, more than half 3 and 4, and almost the whole of 1 and 1*a*, distally evenly curved, reaching almost to the margin in 1. A basal scent patch in the base of space 1, overlapping a little into the cell ; in *carcina* this patch extends also into 1*a* and the blue colour is restricted in 4 and 5, and is often absent in 6. Vein 1, the median and subcostal swollen at base.

Upperside hind wing : much as in *carcina* ; blue from veins 1–6 with fine black margin ; costal margin broadly black.

Underside : differs from *carcina* in the paler ground colour, less contrasting pattern and in the much smaller silvery area along the inner margin, which in *carcina* reaches vein 3, and in *coerulea* scarcely to vein 2.

Underside fore wing : dark grey with pale silvery markings as follows : a crescentric submarginal line, followed by a broad second line almost a band ; two very faintly defined postdiscal lines about 3 mm. apart on vein 4, enclosing a darker patch of the ground colour ; silvery at base of costa ; an inner marginal silvery patch in the distal half of space 1 and 1*a* reaching to vein 2.

Underside hind wing : dark grey with pale silvery markings ; a submarginal crescentric line, followed by a broad area of silvery scales ; two well-defined postdiscal lines divided into spots and enclosing a darker band 2 mm. wide ; some scattered silvery spots in cell and basal area.

Length of fore wing : 20 mm.; on the whole slightly larger than *carcina*.

♀ differs from *carcina* Hewitson in the larger size, and paler brighter blue areas.

Antennae, etc. as in male.

Upperside fore wing : black ; bright light blue basal patch from vein 1 to cell and distad only to lower angle of space 4, half 2 and 3, and most of 1 and 1*a*. Distal edge dentate, slightly extended to 1, to within 2 mm. of margin. A black streak on the discocellular more prominent than in *carcina* ; four large white postdiscal spots in 4–7 in an even curve from half-way along costa.

Upperside hind wing : black with restricted light blue patch from veins 1–6 ; black costal margin and black border 4 mm. wide throughout ; distal margin of blue area quite even, but not sharply defined.

Underside : greyish brown ; very similar to *carcina* Hewitson.

Underside fore wing : two pale submarginal crescentric lines ; a postdiscal series of large whitish spots on the veins from 2–7 and a streak in 8. No basal spots.

Underside hind wing : two crescentric submarginal lines with much silvery scaling between them ; a postdiscal series of small whitish spots ; an obscure double irregular line across end of cell, and a few scattered basal spots. Margins fine ; dark brown.

Length of fore wing : 23 mm. (18 mm. in *carcina*).

Holotype ♂. FR. EQUAT. AFRICA : Moyen Congo, Etoumbi. iii.1959. T. H E. Jackson.

Allotype ♀. FR. EQUAT. AFRICA : Ouesso, Mambili Forest. viii.1959. T. H. E. Jackson.

Flies with *carcina* in the same area in FR. EQUAT. AFRICA.

Recorded from : FR. EQUAT. AFRICA : Ouesso and Etoumbi.

Epitola dunia Kirby

(Pl. 3, fig. 28, Pl. 4, fig. 38)

♂ ***Epitola dunia*** Kirby, 1887 : 441.
Type. CAMEROONS.
Epitola dunia Kirby ; Grose-Smith & Kirby, i.1889 : *Lyc. Afr.* pl. 7, figs. 1, 2.

This species was not mentioned by Aurivillius in Seitz and it appears that he considered it a synonym of *carcina* Hewitson.

♀. Similar to the females of *carcina* Hewitson, *coerulea* sp. n. and *flavoantennata* Roche, but darker with restricted blue areas and a thick black streak on the hind wing discocellular.

Legs dark brown with some small light spots at the joints ; palps dark grey-brown above and below ; eyes brown ; frons dark brown ; antennal shaft black above and minutely checkered white below ; club yellow tipped.

Upperside fore wing : black with blue inner marginal patch covering a little over half 1*a* and 1 and 2 to within 2 mm. of the margin ; occasionally two blue spots in cell divided by black ground colour. A series of four postdiscal white spots in 4–7 in an even curve to the middle of the costa.

Upperside hind wing : black with blue area covering the cell, base of 1–3, and half 3 and 4, distally variable in extent. A thick black streak on the discocellular occasionally reduced to a fine line. Broad dark border ; blue more restricted than in allied species.

Underside : light brown as in *carcina* and *coerulea*.

Underside fore wing : two faint pale crescentric submarginal lines ; series of prominent postdiscal white spots from 2–7, but sometimes missing in 3 ; a silvery white patch in 1 and 1*a* about 2 mm. from margin to half the cellules ; no basal spots.

Underside hind wing : two crescentric submarginal lines and a postdiscal series of small whitish spots ; markings faint or sometimes well defined.

Length of fore wing : 17 mm.

Neallotype ♀. NIGERIA : Ogoja Prov., Ikom. ii.1956. T. H. E. Jackson.

Recorded from : SIERRA LEONE : Mano ; NIGERIA : Ikom, Benin, Oban, Warri and Uwet ; BR. CAMEROONS : Mamfe, Barombi.

The following species probably belongs here :

Epitola iturina Joicey & Talbot

(Pl. 9, fig. 86 ; Pl. 10, fig. 96)

♂ *Epitola iturina* Joicey & Talbot, 1921 : 85, pl. 14, fig. 62.
Type. CONGO : forest between Ituri and Lindi Rivers, SW. of Avakubi.
Epitola bella Aurivillius, 1923 : 1200, taf. 1, fig. 2.
Type. CAMEROONS : N'gumesok. (Riksmuseum, Stockholm.)

♀ unknown.

Recorded from : CAMEROONS : Bitje, N'gumesok ; FR. EQUAT. AFRICA : Etoumbi and Mambili ; CONGO : Lusambo, Lowowo Valley, Ituri River.

THE *PINODES* GROUP

A. ♀♀. Plain brown above, sometimes with small obscure pale postdiscal spots in fore wing.

Epitola viridana viridana Joicey & Talbot

(Pl. 5, fig. 39 ; Pl. 6, fig. 49)

♂ *Epitola viridana* Joicey & Talbot, 1921 : 84, pl. 14, figs. 58, 59.
Type. CONGO : South side of Ituri River, 5 days west of Irumu.

♀. Legs brown and white checkered ; palps whitish below with black tips, dark brown above ; eyes dark brown ; frons dark brown ; antennal shaft black above, checkered below ; club minutely yellow tipped, below only.

Upperside : plain brown ; traces of 3 or 4 very faint postdiscal spots in 4, 5 and 6 fore wing.

Underside fore wing : as in the male ; brown with broad black inner marginal streak from 2–5 ; prominent pale postdiscal spots in 4–7, and a pale spot in 2 in the black area ; two pale crescentric submarginal lines. Space 1 pale, whitish.

Underside hind wing : brown ; a series of three obscure parallel crescentric lines in the marginal area.

Length of fore wing : 15 mm.

Neallotype ♀. UGANDA : Bwamba. ix.1941. T. H. E. Jackson.

Taken *in cop.*

The males of this species fly in clearings or over clumps of bush at the edge of the forest from about 9–9.30 a.m. The females fly later laying on dead twigs.

Recorded from : FR. EQUAT. AFRICA : Etoumbi, Ouesso ; CONGO : Epulu, Upper Lowa Valley, Yanga ; UGANDA : Bwamba, Kigezi, Katera, Budongo, Jinja, W. Elgon, etc.

Epitola viridana radiata Baker

♂, ♀ *Epitola radiata* Baker, 1926 : 393.
Type. CAMEROONS : Bitje, Ja River.

Recorded from : CAMEROONS : Bitje, Johann Albrechts Höhe.

Epitola pinodes Druce

♂ *Epitola pinodes* Druce, 1890 : 24.
Type. NIGERIA : Lagos.
♀ *Epitola pinodes* Druce ; Seitz, 1920 : pl. 65, *a*.
Epitola pinodes Druce ; Grose-Smith & Kirby, iv.1891 : *Afr. Lyc.* pl. 13, figs, 1, 2.
Type missing.

Recorded from : SIERRA LEONE : Moyamba, Batkanu ; IVORY COAST ; NIGERIA : Eket.

Epitola orientalis Roche

(Pl. 5, fig. 42 ; Pl. 6, fig. 52)

Epitola orientalis Roche, 1954 : 499, pl. 22, figs. 35, 36.
Type. UGANDA : Bwamba.

Very similar to *viridana* Joicey & Talbot, but differs below.

♀. Legs brown and white checkered ; palps whitish, streaked black below with black tips, above basally whitish with long black tips ; frons dark brown ; antennal shaft black above, checkered white and black below ; club orange-tipped.

Upperside : plain dark brown with four bluish postdiscal spots from 4–7 on fore wing.

Underside : as in the male, cf. figure in Roche loc. cit.; the dark postdiscal band in hind wing below is plainly visible.

Length of fore wing : 16 mm.

Neallotype ♀. KENYA : Kakamega. ix.1937. T. H. E. Jackson.

Males of this species were taken at Lake Nabugabo flying over clumps of bushes early in the morning.

Recorded from : UGANDA : Bwamba and Lake Nabugabo ; KENYA : Kakamega.

Epitola catuna Kirby

(Pl. 5, fig. 40 ; Pl. 6, fig. 50)

♂ *Epitola catuna* Kirby, 1890 : 273.
Type. CAMEROONS. (Staudinger Coll.)
Epitola catuna Kirby ; Grose-Smith & Kirby, iv.1892 : *Lyc. Afr.* pl. 17, figs. 11, 12.

Epitola catuna Kirby ; Seitz, 1920 : pl. 64, *g*.
♀ *Epitola mus* Suffert, 1904 : 53 (**syn. n.**).
Type. CAMEROONS : Barombi Station. (Berlin Mus.)
Epitola mus Suffert ; Seitz, 1920 : pl. 65, *e*.

The type of *Epitola mus* Suffert has been examined and proves to be a female of *Epitola catuna* Kirby.

♀ Legs brown with small pale spots on the joints ; palps dark brown above and below ; frons and eyes brown ; antennal shaft black above, checkered below ; club orange-tipped.

Upperside : plain dark brown ; immaculate.

Underside fore wing : brownish grey as in the male ; inner margin broadly pale, then base to vein 5 very slightly darker than ground colour, a few obscure marks in apical area.

Underside hind wing : brownish grey ; three very faint crescentric lines in submarginal and postdiscal areas.

Length of fore wing : 15 mm.

Neallotype ♀. UGANDA : Bwamba, Bundibugyo. v.1954. T. H. E. Jackson.

Recorded from : FERNANDO PO ; SPANISH GUINEA : Riomuni ; BR. CAMEROONS : Barombi ; FR. CAMEROONS : Bitje ; GABOON : Kuilu ; FR. EQUAT. AFRICA : Ouesso and Etoumbi ; CONGO : Epulu, Beni, Ituri ; UGANDA : Bugoma, Budongo, Bwamba, Toro, etc.

Epitola carpenteri Baker

(Pl. 5, fig. 41, Pl. 6, fig. 51, Pl. 9, fig. 83, Pl. 10, fig. 93)

♂ *Epitola carpenteri* Baker, 1921 : 462.
Type. UGANDA : Bugalla Is. Lutoboka. (Hope Dept., Oxford.)

It has apparently been overlooked by Roche *et al.*, that Baker described the male of the above species in his original description, *loc. cit.* and designated a holotype. This specimen has been examined in the Hope Dept., Oxford and found to belong to a species near *catuna* Kirby. Baker's allotype female belongs to a different species, *Epitola azurea* sp. n., which is described later in this paper.

To add to the original description of the male, it may be said that *carpenteri* differs from *catuna* in the more prominent blue streaks on fore wing in spaces 4 and 5, in the wider black border in hind wing and in the different underside. In the former, the underside ground colour is warm brown instead of dark grey ; the black basal patch, fore wing, is much more prominent, as are also the darker submarginal and discal lines in hind wing. Further, it is larger ; length of fore wing ; 15 mm.; in *catuna* 13–14 mm.

♀. *Upperside :* plain dark brown in both wings, with some very scattered blue scales in the discal and postdiscal areas of the fore wing.

Underside : as in the male, but paler ; the pale markings in the cell of fore wing less distinct.

Length of fore wing : 14 mm.

Neallotype ♀. UGANDA : Sesse Isles, Bugalla Is. ix–x.1958. T. H. E. Jackson.

Recorded only from : UGANDA : Sesse Isles, Bugalla and Entebbe.

This species is very near *catuna* Kirby, but the differences are deemed sufficient to accord it specific rank, especially since *catuna* is known to occur very near Entebbe.

Both sexes have been taken feeding on low shrubs among *Crematogaster* ants at the edge of the forest on Bugalla.

Epitola ghesquieri Roche

(Pl. 5, fig. 43, Pl. 6, fig. 53)

♂ *Epitola ghesquieri* Roche, 1954 : 498, pl. 22, figs. 33, 34.
Type. CONGO : Equateur Dist., Eala. (M.R.C.B., Tervuren.)

♀. Legs black with small pale spots at the joints ; palps black above and below ; eyes brown ; frons black ; antennal shaft black above and checkered black and white below ; club orange tipped.

Upperside : plain dark brown ; no markings.

Underside fore wing : dove grey ; large black area between veins 2 and 5 from base to within 1 mm. of margin, broadly club-shaped. Two very faint crenulate submarginal lines.

Underside hind wing : dove grey, markings scarcely visible but faint traces of submarginal lines.

Length of fore wing : 13 mm.

Taken *in cop.*

Neallotype ♀. FR. EQUAT. AFRICA : Ouesso, Ketta Forest. x.1959. T. H. E. Jackson.

Recorded from : FR. EQUAT. AFRICA : Ouesso Dist. ; CONGO : Equateur Dist., Eala.

Epitola nigeriae **sp. n.**

(Pl. 5, figs. 44, 45, Pl. 6, figs. 54, 55)

Above nearest to *ghesquieri* Roche, but quite different below.

♂. Legs black, spotted with white at the joints ; palps black above, below spotted white and with white tips, covered in long hair ; eyes brown ; frons black, hairy ; antennal shaft black above, checkered black and white below ; club minutely yellow-tipped.

Upperside fore wing : black ; some scattered dark blue scales in the upper basal portion of cellule 1. Vein 1 for half its length, the median, subcostal and costal swollen.

Upperside hind wing : black with very dark blue basal and discal patch from veins 1–6 ; inner margin black ; border black of even width throughout just over 1 mm. Median vein and extending half-way along vein 4 blackened ; veins 2 and 3 also black.

Underside fore wing : dark grey ; traces of the crenulate submarginal lines only visible under a glass ; a club-shaped black patch from base to within 1 mm. of the distal margin, rounded distally between veins 2–5 ; a large square patch of the ground colour on the distal half of the inner margin.

Underside hind wing : dark grey ; the usual crenulate lines scarcely visible.

♀. *Upperside :* plain dark brown, fringes light brown.

Underside : exactly as in the male but ground colour ochreous brown ; the lighter patch on the distal margin, fore wing, confined to space 1*a*.

Length of fore wing : ♂ and ♀ 16 mm.

Holotype ♂. NIGERIA : Ogoja Prov., Ikom. x.1955. T. H. E. Jackson.

Allotype ♀. NIGERIA : Ogoja Prov., Ikom. i.1956. T. H. E. Jackson.

Recorded from : NIGERIA : Ikom ; CAMEROONS : Bitje ; FR. EQUAT. AFRICA : Ouesso Dist.

Epitola nigra Baker

♂, ♀ *Epitola nigra* Baker, 1903 : 331.
Types. SIERRA LEONE : Moyamba.

Recorded from : SIERRA LEONE : Moyamba ; NIGERIA : Eket ; CAMEROONS : Bitje.

B. ♀♀ brown with 3–4 white (or pale blue) postdiscal spots beyond cell and between cell and inner margin of fore wing ; hind wing broadly suffused blue to very pale blue, between veins 1 and 6 from base to margin, or occasionally with only a few scattered blue scales.

Epitola cephena Hewitson

The female described by Hewitson as *cephena* is the female of *doleta* Kirby, and the former having priority the name *doleta* must sink as a synonym. The male placed by Roche (1954 : 501) to *cephena* is *mercedes* Suffert, and has a different female.

Epitola cephena cephena Hewitson

♀ *Epitola cephena* Hewitson, 1873 : 151.
Type. GABOON.
Epitola cephena Hewitson ; Hewitson, 1878 : pl. *1b*, figs., 9, 10.
Epitola cephena Hewitson ; Seitz, 1920 : pl. 65, *e*.
♂ *Epitola doleta* Kirby, 1890 : 273 (**syn. n.**).
Type. SIERRA LEONE.
Epitola doleta Kirby ; Grose-Smith & Kirby, iv.1892 : *Lyc. Afr.* pl. 17, figs. 1, 2.
Epitola doleta Kirby ; Seitz, 1920 : pl. 64, g.
Phytala leonina Baker, 1903 : 328.
Type. SIERRA LEONE.
Epitola leonensis Baker, 1904 : 227.
Type. SIERRA LEONE.

Recorded from : SIERRA LEONE : Moyamba, Fula Wusu ; CAMEROONS : Bitje ; NIGERIA : Eket, Oshodi, Ubiaja ; GHANA : Kumasi ; FR. EQUAT. AFRICA : Ouesso ; GABOON.

Epitola cephena entebbeana Baker (**stat. n.**)

(Pl. 5, fig. 46 ; Pl. 6, fig. 56)

♂ *Epitola entebbeana* Baker, 1926 : 392.
Type. UGANDA : Entebbe.

♀. As pointed out by Roche (1954), the female described by Baker belongs to *carcina* Hewitson and the true female is undescribed.

♀. Legs whitish, unmarked ; palps below whitish brown, tips brown, eyes black ; antennal shaft black above, finely checkered white below ; club minutely tipped orange ; frons grey-brown.

Upperside fore wing : very similar to *cephena cephena* Hewitson, ground colour black ; three white blue-edged postdiscal spots in 5–7, half-way along costa ; an inner marginal bluish-white patch covering the basal half of 1*a*, and most of 1 and 2 to within 2 and 1 mm. of margin, respectively ; the spot in 2 white, except in the base.

Upperside hind wing : brownish black ; scattered blue scales across cell and bases of spaces 1–5.

Underside fore wing : whitish grey with jet black patch from base to 1 mm. of margin between veins 2 and 5 ; four white postdiscal spots in 4–7, that in 4 a streak and that in 5 large and triangular ; a streak and large white spot in distal half of 1 in the black patch ; space 1*a* pale grey.

Underside hind wing : pale grey unmarked, as in the typical subspecies.

Length of fore wing : 17 mm.

Neallotype ♀. CONGO BELGE : Mambasa, Epulu. x.1947. T. H. E. Jackson.

The males behave as in other species, flying in clearings early in the morning.

Recorded from : CONGO : Beni, Epulu, Middle Lowa Valley ; UGANDA : Entebbe, Mpigi, W. Elgon.

Epitola mercedes Suffert

(Pl. 5, fig. 47 ; Pl. 6, fig. 57)

♂ *Epitola mercedes* Suffert, 1904 : 53.
Type. CAMEROONS : Johann Albrechts Höhe. (Berlin Mus.)
♂ *Epitola cephena* Hewitson ; Roche, 1954 : 501, pl. 22, figs. 31, 32.

Roche (1954) was well aware that there were two forms of female associated with *cephena* Hewitson, but considered them to be varieties of the same thing. This, however, is incorrect ; the heavily marked form as figured in Seitz, belongs to *cephena* and agrees well with the female of the eastern subspecies *entebbeana* Baker and the more lightly marked insect is the female of *mercedes* Suffert.

The type of *Epitola mercedes* Suffert has been examined, and there is no doubt that it is identical with the male described by Roche (1954) as *cephena* Hewitson.

♀. Legs brown with paler joints ; eyes black ; frons brown ; palps pale brown below, dark brown above ; antennal shaft black above, strongly checkered white below ; club orange-tipped.

Upperside fore wing : greyish black ; blue postdiscal spots in 5 and 6 and a trace of a third in 7 ; two others, larger, about mid-way in spaces 1 and 2. No other marks.

Upperside hind wing : greyish black ; a small rounded blue spot at the end of cell, but sometimes unmarked, which is also true of the male.

Underside fore wing : brownish grey ; postdiscal whitish spots in 1 and 2, as above, and in 4–6 ; jet black streak between veins 2–5, erupting into space 5, from base to 1 mm. of margin ; obscure crenulated submarginal lines.

Underside hind wing : brownish grey with much grey scaling ; two obscure crenulated submarginal lines.

Length of fore wing : 16 mm.

Neallotype ♀. NIGERIA : Lagos Dist., Oshodi. iv.1955. T. H. E. Jackson.

Both sexes were seen at Oshodi flying low down, in deep shape under *Crematogaster*-infested trees.

Recorded from : NIGERIA : Lagos Dist. ; CAMEROONS : Johann Albrechts Höhe.

Epitola ouesso **sp. n.**

(Pl. 7, figs. 59, 60 ; Pl. 8, figs. 69, 70)

Nearest to *cephena* Hewitson in the male and to *pinodes* Druce and *mercedes* Suffert in the female.

♂. Legs dark brown with small paler joints ; palps dark brown above and below with some grey hairs ; frons black ; eyes brown ; antennal shaft black above, finely white checkered below ; club yellow-tipped.

Upperside fore wing : black ; dark blue streak in lower half of cell and dark blue spots in extreme base of 2 and basal half of 1.

Upperside hind wing : black ; dark blue patch covering cell and basal half of 4 and 5 ; more cattered blue scales in 1–3 ; no postdiscal spots and no other markings.

Underside fore wing : dark brown, no grey coloration ; black basal streak restricted by ground colour in 1–3 ; no postdiscal spots or other markings.

Underside hind wing : dark brown, usual markings scarcely visible.

♀. Very similar to female *mercedes* Suffert differing only below, and in the extended blue in hind wing above.

Upperside forewing : brownish black ; small blue postdiscal spots in 5–7, and in base of 1 and 2.

Upperside hind wing : obscurely scaled blue from cell to mid-way in 4 and 5 and in the base of 1 and 2, otherwise brownish black.

Underside fore wing : browner than in *mercedes* ; upper edge of black inner marginal patch perfectly straight along vein 5 ; in *mercedes* there is a broad extension mid-way into space 5 ; large postdiscal white spots in black area in 1 and 2 ; very small white spots in 4–7.

Underside hind wing : brown, faint traces of submarginal and postdiscal crenulate lines.

Length of fore wing : ♂ and ♀ 16 mm.

Holotype ♂. FR. EQUAT. AFRICA : Ouesso, Ketta Forest. x.1959. T. H. E. Jackson.

Allotype ♀. Same data as holotype.

Recorded from : FR. EQUAT. AFRICA : Ouesso Dist. ; only the types.

Epitola azurea **sp. n.**

(Pl. 7, fig. 61, Pl. 8, fig. 71)

♀ *Epitola carpenteri* Baker, 1921 : 462, pl. 22, figs. 37, 38.
Allotype. UGANDA : Dama Is., L. Victoria. (Hope Dept., Oxford.)

The male associated with this female by Roche belongs to *mpangensis* sp. n. See below.

♂. Legs brown with pale spots on joints ; palps pale whitish below with dark tips, black above ; frons whitish grey with broad brown median band ; antennal shaft black above, finely checkered white below ; club pale-tipped.

Upperside fore wing : black with pale bright blue spots as follows : a spot in base of cell, another linear and irregular in centre, a large spot covering all of 1 to within 2 mm. of margin, another spot in base of 2 and a few blue scales in 1*a* ; a black spot of the ground colour usually, but not always present in upper centre of blue area in 1.

Upperside hind wing : black ; large pale bright blue discal area from veins 1–6 ; narrow black margin and black costal area.

Underside fore wing : silvery grey ; black inner marginal streak bounded by vein 5 ; two very large silvery white spots in distal half of 1 and 2, almost obliterating the black area distally ; silvery crescentric submarginal lines ; three silvery spots in line, horizontally along upper edge of black area.

Underside hind wing : silvery grey ; heavily irrorated with silver scales throughout ; submarginal and postdiscal silvery crescentric lines and a square silvery patch in the base of 4.

Length of fore wing : 13 mm.

This species differs from *mpangensis* sp. n. in the much paler brighter blue, the extended blue area of fore wing and in the smaller expanse. A series of males were taken in the type locality, with females and there is no doubt as to its identity.

Holotype ♀. That described by Baker as allotype of *E. carpenteri* Baker.

Allotype ♂. UGANDA : Masaka, Sango Bay, Katera. v.1956. T. H. E. Jackson.

The males fly under the canopy, never venturing outside ; flight is fast but short and continues later than in most species up to about 11 a.m. The females fly later, laying on lichen-covered tree trunks. So far known only from this locality.

Recorded from : UGANDA : Sango Bay, Katera, Dama Is., L. Victoria.

Epitola mpangensis sp. n.

(Pl. 5, fig. 48, Pl. 6, fig. 58)

♂ *Epitola carpenteri* Baker ; Roche, 1954 : 500, pl. 22, figs. 37, 38.

♂. Described and figured by Roche, loc. cit., as *carpenteri* Baker.

♀. Similar to *azurea* sp. n., but with much darker underside.

Legs dark brown with pale spots on the joints ; palps dark grey below, pale grey above with black tips ; frons and eyes dark brown ; antennal shaft checkered white above and below ; club with minute yellow tip.

Upperside fore wing : black ; four white blue-edged postdiscal spots in 4–7 ; a large white spot covering most of 2 ; space 1 blue, distally bluish white to within 2 mm. of margin, space 1*a* blue from base to middle.

Upperside hind wing : black ; large blue discal area from veins 1–6, distally paler ; border of even width about 3 mm.

Underside fore wing : brownish grey ; postdiscal spots in 4–7 and 1 and 2 much larger than in *azurea*, the latter filling up most of the black inner marginal streak ; latter as in *azurea* ; submarginal lines merged into wide grey border.

Underside hind wing : brownish grey with two submarginal and one postdiscal crenulate lines and square grey patch in 4 as in *azurea* ; scattered basal grey spots.

Length of fore wing : 15 mm.

This species can be distinguished from *azurea* in the male by the darker blue and more restricted spots on fore wing and by the greater expanse. In the female by the darker underside.

Holotype ♂. That cited by Roche, loc. cit., as " Allotype " ♂ *Epitola carpenteri* Baker. UGANDA : Bwamba. x.1941. T. H. E. Jackson.

Allotype ♀. UGANDA : Mpigi, Mpanga Forest. viii.1959. T. H. E. Jackson.

Recorded from : CONGO : Lowa Valley and Katanga ; UGANDA : Bwamba and Mpigi.

Epitola katerae sp. n.

(Pl. 7, figs. 62, 63, Pl. 8, figs. 72, 73)

In the male nearest to *ghesquieri* Roche, *nigeriae* sp. n. and *mercedes* Suffert of the previous group and in the female to *azurea* sp. n. and *mpangensis* sp. n.

♂. Legs brown with very small pale spots at the joints ; frons and eyes brown ; palps brown below with some grey hairs, brown above with black tips ; antennal shaft checkered black and white above and below (a very unusual character) ; club black, very minutely orange-tipped.

Upperside fore wing : black ; immaculate.

Upperside hind wing : black with dark blue discal basal patch between veins 1–6, covering only the basal portions of spaces 1–5 and ending distally in scattered blue scales ; a wide black distal border, 3–4 mm. and black costal border ; veins 2–4 black ; distal edge of blue patch ill-defined.

Underside fore wing : dark grey ; black inner-marginal streak between veins 2–5 ; large pale grey square spot in distal part of 1 and 1*a* ; postdiscal pale spots in 4–7, conjoined to form a line ; another larger silvery spot in 2 ; margin speckled with silvery scales.

Underside hind wing : dark grey ; irrorated with silvery scales, the individual lines obscured ; a more prominent patch of silver scales in the base of 4 and 5.

♀. Very similar to *azurea*.

Legs, eyes, palps and frons much as in male, but paler ; antennal shaft checkered on both surfaces as in male (in *azurea* jet-black above in both sexes).

Upperside fore wing : greyish black ; large white, blue-edged postdiscal spots in 4–7, the latter a streak ; another, broad, elongate in 2 to 1 mm. of margin ; the whole of 1 to 2 mm. of margin light bluish ; basal half of 1*a*, also, bluish ; a small black streak from mid-way along median vein, invading blue area in 1.

Upperside hind wing : paler, blackish grey ; pale bluish basal-discal patch from veins 1–6, distal and costal borders of ground colour, former about 2 mm.; the blue area slightly paler distally.

Underside fore wing : differs from *azurea* in the greater amount of dark ground colour and from *mpangensis* in the absence, as such, of the inner-marginal black streak, which in this species merges into the discal ground colour. Ground colour dark grey-brown ; large white patch on inner-margin comprising the postdiscal spots in 1 and 2 and covering the whole distal half of 1 and more than half 2 ; white postdiscal spots in 4–7 above ; a prominent thick white submarginal crenulate line ; apex and distal border thickly irrorated with silvery white scales.

Underside hind wing : brownish grey ; the whole covered with silvery white scales with a more prominent silvery white patch in the base of 4 and 5 ; a dark crenulate submarginal line.

Length of fore wing : ♂ and ♀, 16 mm.

Holotype ♂. UGANDA : Masaka, Sango Bay, Katera. viii.1956. T. H. E. Jackson.

Allotype ♀. Same data as holotype. xi.1954.

This species is, so far, only known from Katera, Masaka Dist., where the males were taken on an open hillside flying over small trees and bushes from about 9–9.30 a.m. The females were found laying on the lichen-covered trees among *Crematogaster* ants.

Epitola rileyi Audeoud

♂, ♀ *Epitola rileyi* Audeoud ; 1936, 704, pl. 7, figs. 3 ♀ ; 4 ♂.
Types. CAMEROONS : Lolodorf. (Audeoud, Coll. Geneva.)

This species, probably belongs here, although it differs from all others in the crenulated margins to the wings.

There are no specimens of this species in the British Museum (Nat. Hist.).

Epitola kamengensis **sp. n.**

(Pl. 7, figs. 64, 65 ; Pl. 8, figs. 74, 75)

Near *katerae* sp. n., but larger and differing below.

♂. Legs brown, white at the joints ; palps brown, scaled grey below ; brown, black-tipped above ; eyes and frons brown ; antennal shaft checkered black and white on both surfaces as in *katerae* ; club black, orange-tipped. Thorax clothed in green hair.

Upperside fore wing : plain black, unmarked.

Upperside hind wing : black with large dark, electric blue discal area from veins 1–6, reaching nearly to the margin ; black, even, distal border 1 mm. wide, and black costal border ; space 1*b* black.

Underside fore wing : dark grey with black inner-marginal streak from veins 2–5, broken at distal half of inner margin by a dark grey patch ; a light grey spot mid-way in 1 and a small one in base of 2 ; small pale streaks, discal, in 4–7 ; prominent white submarginal spots from 3 to costa and silvery scales in distal border.

Underside hind wing : dark grey, heavily coated with silver-grey scales throughout the whole of the distal half, arranged roughly into two submarginal bands and a broader band horizontally across the wing, distal of the cell, leaving a small dark area at the base of 2 and 3 ; basal area with scattered silver-grey spots.

♀. Similar to ***azurea*** sp. n., ***katerae*** sp. n., etc., but larger.

Legs pale brown, slightly paler at the joints ; palps pale brown dusted with pale grey scales ; frons dark brown ; eyes brown ; antennal shaft black, conspicuously checkered with white, above and below ; club broad and flattened, orange-tipped.

Upperside fore wing : blackish brown ; three large white postdiscal spots in 5–7 with a streak in 8 ; other spots in 1–3 inclusive, that in 1 blue, extending from base to middle ; in 2 from base to within 3 mm. of margin and basally blue ; in 3 white to within 2 mm. of margin ; discal area and beyond somewhat darker black.

Upperside hind wing : blackish brown with large blue discal patch extending from veins 1–6, and distad, dislegnic, to within 3 mm. of the margin, leaving a black-brown marginal band ; vein 6 to costa black-brown ; a paler patch due to admixture of white scales, in the distal half of blue area in spaces 5 and 6. Fringes dark brown in fore wing and from vein 3 to anal angle hind wing, but white from vein 3 to costa in hind wing.

Underside : the dark basal area in hind wing, exactly as in the male, leaves no doubt as to the identity of this insect.

Underside fore wing : dark sepia with white postdiscal spots as above, but, in addition, a small white spot in space 4, this completing the series ; apex and distal margin broadly greyish white, proximal edge indented.

Underside hind wing : pale brown with four crescentric pale greyish white bands, merging into each other and much grey scaling ; the paler patch in the blue area above in 5 and 6 reproduced as a square whitish spot ; basal area including most ot cell, much darker than rest of wing and strongly contrasting as in the male.

Length of fore wing : ♂ 19 mm.; ♀ 17 mm.

Holotype ♂. UGANDA : Mawakota, Kamengo. viii.1953. V. G. L. Van Someren.

Allotype ♀. BRIT. E. AFRICA : Nandi Escarpment (Forest), 5,800 ft. 29.v.1911. S. A. Neave.

This species was taken by Van Someren, flying from the forest edge out into a coffee plantation at about 9.30 a.m.

Recorded from : UGANDA : Kamengo and Katera ; KENYA : Nandi Escarpment.

C. The following two species are included in the *PINODES* group, in spite of the convex margin of the fore wing, since in all other characters, including those of the females, they are similar

Epitola conjuncta conjuncta Grose-Smith & Kirby

♂, ♀ *Epitola conjuncta* Grose-Smith & Kirby, i.1893 : *Lyc. Afr.* 86, pl. 20, figs. 3–5.
Type. SIERRA LEONE. (Staudinger Coll.)

Recorded from : SIERRA LEONE ; FR. EQUAT. AFRICA : Sembe, Etoumbi.

Epitola conjuncta budduana Talbot

♂, ♀ ***Epitola conjuncta budduana*** Talbot, 1937 : 62, pl. 1, figs. 2 ♂ ; 3 ♀.
Types. UGANDA : Katera.

Recorded from : UGANDA : Budongo, Bwamba, Katera, Tero Forest, Buddu.

Epitola dolorosa Roche

♂, ♀ *Epitola dolorosa* Roche, 1954 : 498, pl. 21, figs. 27, 28 ♂, 29, 30 ♀.
Types. ♂, UGANDA : Bwamba. Allotype ; ♀, UGANDA : Entebbe.

Recorded from : UGANDA : Bwamba, Entebbe, Tero Forest, Buddu.

The following species also belong to the *PINODES* group, but I am unable to place them in any of the subdivisions defined in this paper, since the females are unknown.

Epitola obscura Hawker-Smith

♂ *Epitola obscura* Hawker-Smith, 1935 : 11.
Type. NIGERIA : Lagos.

♀ unknown.
Recorded from : NIGERIA : Lagos, Ilesha ; GHANA : Ashanti.

Epitola maculata Hawker-Smith

♂ *Epitola maculata* Hawker-Smith, 1926 : 240.
Type. CONGO : Stanleyville, Elisabetha near Basoko. (M.R.C.B., Tervuren.)

♀ unknown.
Recorded from : CONGO : Stanleyville ; UGANDA : Bwamba.

Epitola pinodoides Grose-Smith & Kirby

♂ *Epitola pinodoides* Grose-Smith & Kirby, i.1893 : *Lyc. Afr.* pl. 20, figs. 1, 2.
Type. SIERRA LEONE. (Berlin Mus.)

♀ unknown.

The type of this species is in the Humboldt Universität, Berlin, who kindly forwarded it for examination. It is very similar to *Epitola cephena* Hewitson, although the colour of the blue spots is paler and the insect is smaller. Without more material from Sierra Leone it seems inadvisable to sink it, however, to *cephena*. The type was examined by Monsieur H. Stempffer and found to be a true *Epitola*.

Epitola lamborni Baker

♀ *Epitola lamborni* Baker, 1921 : 461.
Type. S. NIGERIA : Ibadan.

♂ unknown.

The type of this species is missing and it is, therefore, impossible to be sure of its identity. From the description, it is near *albomaculata* Baker.

THE *SUBLUSTRIS* GROUP

The four species which follow differ from all known *Epitola* in the presence of a large patch of lustrous scales covering the whole discal area of the fore wing.

Epitola pseudoconjuncta sp. n.

(Pl. 7, figs. 66, 67, Pl. 8, figs. 76, 77)

Very similar to *conjuncta budduana* Talbot, but much smaller and with large patch of lustrous scales over the whole discal area of fore wing.

♂ and ♀. Legs dark brown with paler joints ; palps brown with grey scales below, black above ; eyes black ; frons black ; antennal shaft black above, finely checkered white below ; club broad and flattened, minute orange tip.

♂. *Upperside fore wing :* black with dark blue spots as follows : three postdiscal in 4–6 and a minute dot in 7 ; blue spot half-way in 2 ; long blue streak in 1, covering most of the cellule except angle between vein 2 and median and reaching to within 2 mm. of distal margin ; whole discal area up to blue postdiscal spots covered in black lustrous scales.

Upperside hind wing : black ; large blue discal area from vein 1 to just short of vein 7 ; distal border narrow black, ½ mm. costal border black ; veins black, especially median.

Underside fore wing : brownish grey ; large black inner-marginal patch from veins 2–5 and to 1 mm. of distal margin ; small silver-grey postdiscal spots on vein 2 and in 4 and 5, inner margin silver-grey ; faint traces of darker submarginal line.

Underside hind wing : brownish grey ; faint dark submarginal and marginal lines ; no other markings.

♀. Legs dark brown checkered white at the joints ; palps, frons and eyes dark brown ; antennal shaft dark brown, boldly checkered with white, club minutely orange-tipped.

Fore wings strongly convex, as in the male.

Upperside : plain dark brown, unmarked.

Underside fore wing : pale straw-coloured ; space 1 very pale grey, almost white ; thereafter a black patch from veins 1–5 ; white postdiscal spots in 2, 5 and 6 ; very obscure submarginal line.

Underside hind wing : pale straw-coloured, with faint, paler, submarginal and postdiscal lines.

Length of fore wing : 16 mm. ♂ ; 15 mm. ♀.

Holotype ♂. UGANDA : Masaka, Sango Bay, Katera. xi.1956. T. H. E. Jackson. Note : a beak-mark is plainly visible on left fore wing of holotype.

Allotype ♀. UGANDA : Masaka, Sango Bay, Katera. xi.1933. T. H. E. Jackson.

This species has only been taken at Katera, where it flies with *conjuncta budduana* Talbot, which it closely resembles. Both species were taken together flying from high up to some 10 ft. from the ground early in the day, and the resemblance to the larger, more powerful *conjuncta* is obviously protective ; *pseudoconjuncta* continues to fly a little later than *conjuncta*, up to about 11 a.m.

Epitola mengoensis Baker

(Pl. 9, fig. 79, Pl. 10, fig. 89)

♂ *Epitola mengoensis* Baker, 1906 : 105.
Type. UGANDA : Mengo.

♀. *Upperside :* warm brown in both wings ; no markings.

Underside fore wing : warm brown ; the usual darker basal patch, but not strongly contrasting ; a pale spot at end of cell and another in space 2 and the whole of 1 pale grey ; a series of strongly marked, submarginal, crescentric spots.

Underside hind wing : warm brown ; a darker patch basad ; a well-defined crescentric, submarginal line followed by another, similar, but finer.

Length of fore wing : 17 mm.

Allotype ♀. Mengo (UGANDA). iii.1900. F. J. Jackson.
Recorded from : UGANDA : Mengo, Mpigi, Entebbe.

Epitola vinalli Talbot
(Pl. 7, fig. 68 ; Pl. 8, fig. 78)

♂ *Epitola vinalli* Talbot, 1935 : 75.
Type. BELGIAN CONGO : Tshuapa, Basankusu. (Hope Dept., Oxford.)
♂ *Epitola subcoerulea* Roche, 1954 : 498, pl. 21, figs. 25, 26 (**syn. n.**).
Type. SIERRA LEONE.

The type of *E. vinalli* Talbot is identical with that of *subcoerulea* Roche and the latter must sink as a synonym.

♀. Legs dark brown with white spots at the joints ; eyes, palps and frons dark brown ; antennal shaft black above, checkered white below ; club orange-tipped.

Upperside : plain dark brown ; distal margin of fore wing strongly convex as in male ; a lighter patch in fore wing between spaces 4–6, where the white postdiscal spots of underside show through.

Underside fore wing : brown ; jet black inner-marginal patch from base to 1 mm. of margin, between veins 2–5 ; inner-marginal border silvery white throughout ; very small pale postdiscal spot on vein 2 ; two white postdiscal spots in 4 and 5 and small pale spots in 6 and 7 ; crenulate submarginal line.

Underside hind wing : brown ; faint submarginal and postdiscal lines.

Length of fore wing : 15 mm.

Neallotype ♀. FR. EQUAT. AFRICA : Moyen Congo, Etoumbi. iii.1959. T. H. E. Jackson.

Recorded from : GAMBIA ; SIERRA LEONE ; FR. EQUAT. AFRICA : Etoumbi.

Epitola sublustris Baker

♂, ♀ *Epitola sublustris* Baker, 1904 : 228.
Type. SIERRA LEONE.

In the Lamborn duplicate collection at the Hope Department, Oxford was found a female *Epitola* labelled : " Comp. with Type *Epitola sublustris* Bethune-Baker ", Lagos, Oni, W. A. Lamborn, iii–xii.1911. The type female is in British Museum (Nat. Hist.) and the Oxford specimen is a female of *Epitola dolorosa* Roche.

Recorded from : SIERRA LEONE : Moyamba ; IVORY COAST ; NIGERIA : Ubiaja, Oshodi ; BR. CAMEROONS : Kumba ; FR. CAMEROONS : Johann Albrechts Höhe ; GHANA : Aburi, Ashanti.

The following species differs from all other known *Epitola*, in the underside markings, but, from the convex distal margin of the fore wing, belongs near *conjuncta*. No lustrous scales in fore wing.

Epitola barombiensis Kirby
(Pl. 9, fig. 80 ; Pl. 10, fig. 90)

♂ *Epitola barombiensis* Kirby, 1890 : 274.
Type. CAMEROONS : Barombi. (Staudinger Coll.)

♀. *Upperside :* both wings dark brown—unmarked.

Underside : as in the male, but paler.

Neallotype ♀. UGANDA : Bwamba. ii–iii.1957. R. Carcasson.

THE *ALBA* GROUP

The following new species is quite unlike any known *Epitola* and must remain in a group of its own.

***Epitola alba* sp. n.**

(Pl. 9, figs. 81, 82, Pl. 10, figs. 91, 92)

♂. Legs brown, faintly paler at the joints ; eyes, palps and frons brown ; antennal shaft black above, minutely checkered below ; club minutely yellow-tipped.

Upperside fore wing : black-brown ; large white discal area from 1*a*–6, scaled blue at the base, distally rounded and dentate ; a broad, triangular black spot at end of cell from costa ; costal margin narrowly black ; wide black-brown distal border ; median and subcostal veins swollen at base, the former black to lower angle of cell.

Upperside hind wing : black-brown ; white discal patch between veins 1–6, from base over cell, bases of 2, 3 and 4 and half space 1 ; broad black distal and costal borders ; the white discal patch is elongated, being broader on vein 6 than on vein 1.

Underside fore wing : dark silver-grey ; white discal patch as above ending at the middle of the costa in 10 ; a broad dark grey postdiscal band to vein 4, with fine pale line distad ; small rounded basal patch on mid-costa, extending basad to inner margin ; very obscure submarginal line ; distal border broadly dark grey.

Underside hind wing : dark silver-grey ; white discal patch as above ; some obscure dark grey costal markings ; an obscure dark postdiscal line ; a crenulated dark grey submarginal line followed by a fine pale line ; border dark grey, 1 mm.

♀. *Upperside :* similar to male ; basal blue area fore wing smaller and median vein not black ; triangular cistal spot larger and darker, hind wing as in the male but basal blue smaller.

Underside : paler, more brownish but markings as in the male ; broad dark postdiscal band extends to vein 3, fore wing ; the postdiscal line on hind wing shifted further distad ; otherwise as in the male.

Length of fore wing : ♂ 16 mm.; ♀ 17 mm.

Holotype ♂. FR. EQUAT. AFRICA : Ouesso, Mambili Forest. vi.1959. T. H. E. Jackson.

Allotype. Same data as holotype. viii.1959.

Recorded only from the above locality.

SPECIES *INCERTAE SEDIS*

Epitola pulverulenta Dufrane

Epitola pulverulenta Dufrane, 1953 : 51.
Type. Monsieur Dufrane states that the type is lost.

Since many of these small brown females are very much alike, it is not possible to be certain of an identity from a description alone.

SPECIES INCORRECTLY PLACED IN *EPITOLA*

Phytala benitensis (Holland) (**comb. n.**)

♂ *Epitola benitensis* Holland, 1890 : 425.
Type. GABOON : " Upper waters of the River Ogove." (Carnegie Mus., Pittsburgh.)

This species belongs to *Phytala* Westwood. Mr. Harry K. Clench of the Carnegie Museum, Pittsburgh, who has kindly examined the type, writes as follows : " I have checked the type for venation and find that it is a *Phytala*. From the figures in Grose-Smith & Kirby 1893 (*Rhop. Exot.* **23** ; *Lyc. Afr*, 86) I suspect it to be very close to *rezia* Grose-Smith & Kirby, if not the same ". The figure and description of the female in Grose-Smith & Kirby, *loc. cit.*, is that of a male. The authors state, in a footnote, that *rezia* does not have the peculiar falcate fore wings of *benitensis* Holland, and it is considered by the present author that the two species are distinct.

Liptena langi (Holland) (**comb. n.**)

♂ *Epitola langi* Holland, 1920 : 217, pl. 12, fig. 10.
Type. CONGO : Medje. (American Mus., N. York.)

Judging by the coloured plate this insect appears to be a male of *Liptena despecta* Holland and Mr. Frederick H. Rindge of the American Museum, New York, who has kindly examined the type, writes : " I have examined Holland's type. By using the keys and discussion in Seitz, I have concluded that *langi* Holland should definitely be placed in the genus *Liptena*. The venation is of this genus and not of *Epitola*." There appears to be very little doubt that *Epitola langi* should sink to *Liptena despecta* Holland.

Phytala rezia (Grose-Smith & Kirby) (**comb. n.**)

♀ *Epitola rezia* Grose-Smith & Kirby, i. 1893 : *Lyc. Afr.* 86, pl. 20, fig. 6.

This species belongs to *Phytala* Westwood.

Aslauga subfulvida (Holland) (**comb. n.**)

♀ *Epitola subfulvida* Holland, 1890 : 423.
Aslauga leonae Aurivillius in Seitz, 1920 : 343 (**syn. n.**)

Aslauga purpurascens (Holland) (**comb. n.**)

♀ *Epitola purpurascens* Holland, 1890 : 424.

Through the kindness of Mr. Harry K. Clench of the Carnegie Museum, Pittsburg, I am enabled to state that the above two species belong to *Aslauga* Kirby, the first being synonymous with *leonae* Aurivillius, and the second with *Aslauga purpurascens* Holland.

DISCUSSION

Comparing this arrangement with the key in Roche (1954), the following, more important, points emerge :

(*a*) The *HEWITSONI* and *POSTHUMUS* groups remain as before.

(*b*) Part of the first section of the *PINODES* group is treated separately and is named the *SUBLUSTRIS* group. This includes four species listed by Roche with convex distal margin in fore wing. All four are small and have a large patch of lustrous scales in the discal area of the fore wing.

(*c*) The remainder of the *PINODES* group remains as before, but subdivides on the pattern of the females into two. The species concerned, however, intergrade and are obviously closely allied.

(*d*) On the pattern of the females the *CARCINA* and *NITIDE* groups merge and, from a study of the uppersides of the males, and of the pattern of the females, this is probably correct. On the other hand the four subdivisions are rather further from each other than are those of the *PINODES* group.

(*e*) ***Epitola alba*** sp. n., cannot be united with any of the existing groups and ***Epitola barombiensis*** Kirby is separated on its peculiar underside.

Genus ***STEMPFFERIA*** **gen. n.**

Type species: *Stempfferia carcassoni* sp. n.

Differs from *Deloneura* Trimen and *Neaveia* Druce in the genital armature ; from *Batelusia* Druce in the venation (only 11 veins in the latter) ; from *Tumerepes* Baker in that the legs are not swollen ; from *Epitola* Westwood, *Hewitsonia* Kirby and *Phytala* Westwood in the pattern and in the shape of the wings ; eyes faintly hairy ; second segment of palps, laterally compressed ; third segment cylindrical, terminating in a point ; antennae half length of costa ; club slightly swollen.

Wings ; costal border of fore wing arched at base, then straight ; external border strongly convex ; hind wing suboval, anal angle obtuse. In both sexes a fringe of long hair along inner-margin of fore wings. Venation : fore wing 12 veins, median much swollen at base in male, less so in female ; vein 3 from a little before the lower angle of the cell : vein 4 from this angle ; vein 5 from much nearer 6 than 4 ; vein 6 from the upper angle of the cell ; vein 7 from well before this angle, ending below the apex ; vein 8 branching from 7 and ending on the costal border ; vein 9 long, branching from 7 ; in the male vein 10, feebly stalked, arising from 7, not far from its origin ; vein 11 free, from same origin as 7 ; in the female ; vein 10 arising from the same point as 7 ; vein 11 from a little before ; hind wing ; veins 3 and 4 briefly stalked, from lower angle of cell ; lower discocellular concave ; vein 5 nearer 6 than 4 ; 7 from a little before the lower angle of cell ; genital armature ; of the usual Epitolinae type ; uncus in the form of a crescent, edging the subtriangular tegumen ; subunci long, arched near the base ; swollen at the level of the bend, ending in a slightly curved fine point (in the figured slide, the subunci have been set aside laterally in order to be better visible, but *in situ* they are folded up below the tegumen). Vinculum rather narrow, prolonged by a triangular saccus which is, at its extremity, furnished with long scales ; lower fultura very reduced, valvae subrectangular, the upper process ending in a slightly curved point, penis short, very stout, the distal extremity obliquely cut and widely open on the dorsal side. Uncus furnished with long, fine hair, much fine hair also on the distal half of the upper process of valvae (in the figure, the bases of hair only are figured, this for the sake of clearness).

Sexual dimorphism very striking ; the male upperside is blue, that of the female yellowish white.

This genus is named in honour of Monsieur H. Stempffer of Paris, who, more than any other person, has succeeded in unravelling the complexities of the African Lycaenidae, and achieving an orderly presentation of their systematics.

Stempfferia carcassoni **sp. n.**

(Pl. 11, figs. 103, 108, Pl. 12, figs. 113, 118)

♂ and ♀. Legs, frons and palps black ; eyes brown, slightly hairy ; antennal shaft black above, checkered white below ; wings rounded ; fore wing obtusely angled at apex ; fringes white, checkered black at the veins.

♂ *Upperside fore wing :* black with broad blue discal-basal patch from inner margin to costa, extending to within 2 mm. of the margin along inner margin and to within 9 mm. of apex along costa ; distal edge evenly rounded ; distal border broadly black.

Upperside hind wing : black with blue discal patch from half space 1*c* to vein 6, evenly rounded distally, costal and distal margins and space 1*b* to half 1*c*, black ; costal margin 3 mm. wide throughout.

Underside : both wings lustrous white, unmarked.

♀. As in the male, but larger and blue areas replaced by yellowish white.

Upperside fore wing : black with yellowish white discal area from base and inner margin to vein 7, with a small extension in space 7 ; broad black distal border and narrow black costal border ; discal patch evenly curved distad.

Upperside hind wing : black with yellowish white discal patch, extending from base and inner margin through to the costa ; brownish black distal border 4 mm. wide.

Underside : as in the male, but less lustrous.

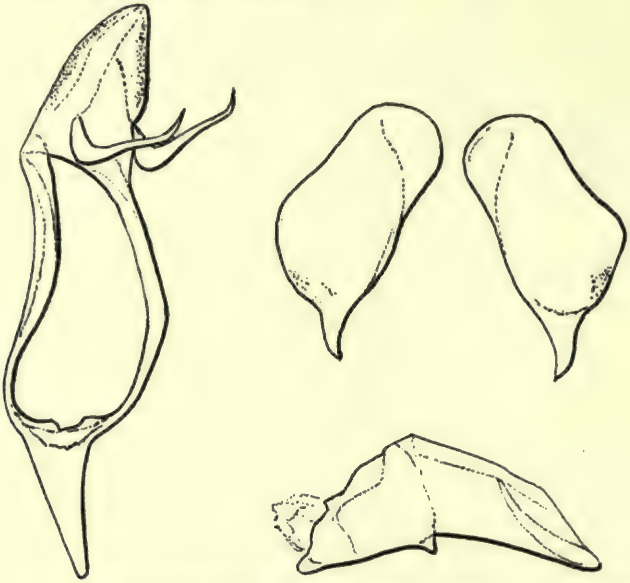

FIG. 1. Genital armature of male *Stempfferia carcassoni* gen. et sp. n.

Holotype ♂. CONGO : Prov. Orientale, Lomami River, Opala. iii.1959. R. H. Carcasson.

Allotype ♀. Same data as holotype.

Recorded from : FR. EQUAT. AFRICA : Ouesso ; CONGO : Lomami River.

This fine new genus and species was first discovered by Mr. R. H. Carcasson of the Coryndon Museum, Nairobi in the Congo, and subsequently has been taken also in French Equatorial Africa. He has kindly allowed me to describe it in this paper and the species is named in his honour.

Genus ***NEAVEIA*** Druce

Neaveia lamborni orientalis **ssp. n.**

(Pl. 11, figs. 101, 102, Pl. 12, figs. 111, 112)

The eastern subspecies has not been described. Differs from the typical race in narrower apical black patch on fore wing above and in the presence of submarginal and postdiscal lines in hind wing beneath.

♂ and ♀. Legs dark brown, paler at the joints ; palps short, dark brown ; frons brown with many white scales ; eyes black ; antennal shaft black above, checkered white below ; club black.

♂. *Upperside fore wing :* greenish white ; black apical patch to vein 3, then continued as a thin marginal line ; in *lamborni lamborni* it is still 1 mm. wide on vein 1 ; costal border only dusted with black scales.

Upperside hind wing : greenish white ; black apical patch to vein 3, then continued as a thin marginal line ; in *lamborni lamborni* it is still 1 mm. wide on vein 1 ; costal border only dusted with black scales.

Underside fore wing : white ; black apical patch shows through from above and is narrow and, as above, ends at vein 3 ; some small brown striae along the margin from vein 3 to the apex and others, submarginal, in 4, 5 and 6 and along the distal half of the costal margin.

Underside hind wing : strongly green ; marginal border striated with scattered brown scales ; a series of submarginal brown spots in spaces 1–8 ; another series postdiscal, arrow-shaped ; a few obscure discal markings ; a fine brown line on the discocellular.

♀. Similar to male, but markings below a little fainter.

Length of fore wing : ♂ and ♀, 20 mm.

Holotype ♂. UGANDA : Masaka, Sango Bay, Katera. xi.1954. T. H. E. Jackson.

Allotype ♀. Same data as holotype. xii.1954.

This species was observed flying in the canopy of lichen-covered trees among *Crematogaster* ants at Katera, Sango Bay.

Recorded from : FR. EQUAT. AFRICA and the eastern CONGO ; UGANDA : Bwamba, Budongo, Katera.

Genus ***EPITOLINA*** Aurivillius

***Epitolina catori ugandae* ssp. n.**

(Pl. 11, figs. 99, 100, Pl. 12, figs. 109, 110)

Differs from *catori catori* Baker in the much larger orange postdiscal band in the fore wing of the female and in the darker underside in both sexes.

♂ and ♀. Legs dark brown covered in yellow hair ; eyes and frons black ; palps black above, yellow below ; antennal shaft widely checkered black and white on both surfaces ; club broad, flattened, minute pale tip.

♂. *Upperside :* does not differ from *catori catori*.

Underside : much darker, red markings more prominent ; on both wings a broad black postdiscal band, distal of the red spots.

♀ *Upperside :* the orange patch on fore wing extends from veins 1*a*–5, with a small spot also in space 5 ; proximad it runs in a curve skirting the cell to the origin of vein 2, then vertically to 1*a* ; distally covers the base of spaces 4 and 5, half 2 and 3, and the middle of 1 and 1*a* ; 3 mm. broad in 1 and 1*a*, and 5 mm. on vein 2.

Underside : as in *catori catori*, but a broad blackish brown postdiscal band in both wings distal of the orange spots ; these bands are very prominent.

Length of fore wing : ♂ and ♀, 12 mm.

Holotype ♂. UGANDA : Mpigi, Mpanga Forest. viii.1959. T. H. E. Jackson.

Allotype ♀. Same data as holotype. iv.1959.

Recorded also from many other parts of Uganda.

Genus ***HEWITSONIA*** Kirby

Hewitsonia boisduvalii (Hewitson)

Corydon boisduvalii Hewitson, 1869 : 1, pl. 1.
Hewitsonia boisduvalii (Hewitson) Hewitson, 1878 : 17, pl. 1*a*, figs, 1, 2.

The type of this species, a female, came from Gaboon and occurs throughout the Southern Cameroon and French Equatorial Africa in the same form, changing to subspecies *congoensis* Joicey & Talbot in the eastern Congo. Specimens from Nigeria and Northern Cameroons differ considerably and warrant a further subspecific name.

Hewitsonia boisduvalii nigeriensis **ssp. n.**

(Pl. 11, figs. 104, 105, Pl. 12, figs. 114, 115)

♂. Differs from the typical race as follows ; the four subapical spots are small, rounded, blue with white centres ; the spot in space 5, as an example, is 2 mm. long, as against 7 mm. The blue colour is darker. The small blue spots extending from the blue patch in the anal angle fore wing into the base of space 2 are here reduced to one small blue streak and a few scattered scales in the base. On hind wing blue patch less extensive, particularly in spaces 5 and 6.

Below, as in typical *boisduvalii.*

♀. Subapical yellow band narrower, 4 mm. wide as against 6 mm. in *boisduvalii* ; yellow spot in inner angle fore wing 6 mm. long, as against 8 mm.; otherwise not differing. Below not differing.

This race is on average smaller than the typical race and in this agrees with *congoensis* Joicey & Talbot.

Holotype ♂. NIGERIA : Lagos District, Oshodi. iv.1955. T. H. E. Jackson.

Allotype ♀. NIGERIA : Onitsha Prov., Awka, Mamu. xi.1959. T. H. E. Jackson.

Hewitsonia similis ugandae **ssp. n.**

(Pl. 11, figs. 106, 107, Pl. 12, figs. 116, 117)

This is the eastern subspecies and differs as follows :

♂. *Upperside :* differs from *similis similis* Aurivillius in the reduction of the blue spots in fore wing ; the spot in the inner angle is missing or represented by a few blue scales ; no blue spots in the cell and those in 2 and 3 much reduced in size ; four white subapical spots in fore wing ; hind wing as in the typical form but with a series of triangular black marginal spots, one in each cellule.

♀. *Upperside :* the subapical white or cream spots are larger than in specimens from Nigeria and Sierra Leone, but smaller than those from the Cameroons—otherwise not differing.

Underside : both sexes ; differs in the much paler ground colour and reduction in the black streaks on hind wing ; the red-brown patch at the distal end of the hind wing costa is scarcely visible, and does not contrast with the rest of the wing.

Holotype ♂. CONGO : Ituri, Beni, 4,000 ft. ix.1946. T. H. E. Jackson.

Allotype ♀. UGANDA : Bwamba. ix.1942. T. H. E. Jackson.

Hewitsonia intermedia Joicey & Talbot (**stat. n.**)

Hewitsonia kirbyi ♀ f. *intermedia* Joicey & Talbot, 1921 : 86.

This insect differs greatly from *kirbyi* Hewitson and should be considered as a separate species.

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PLATE 1

FIGS. 1–9. Uppersides of *Epitola*: (1) *miranda miranda* Staudinger neallotype female, (2) *miranda vidua* Talbot neallotype male, (3) *urania urania* Kirby neallotype female, (4) *urania tanganikensis* Joicey & Talbot neallotype female, (5) *moyambina* Baker neallotype female, (6) *intermedia* Roche neallotype female, (7) *convexa* Roche neallotype female, (8) *uniformis* Kirby neallotype female, (9) *insulana* Aurivillius neallotype female.

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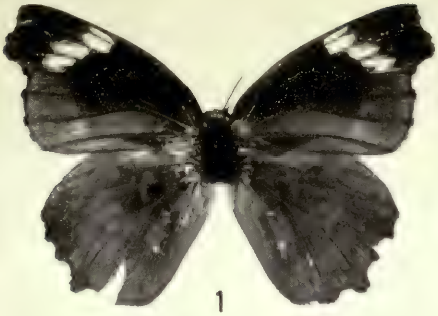

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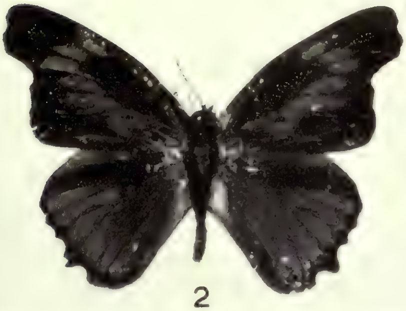

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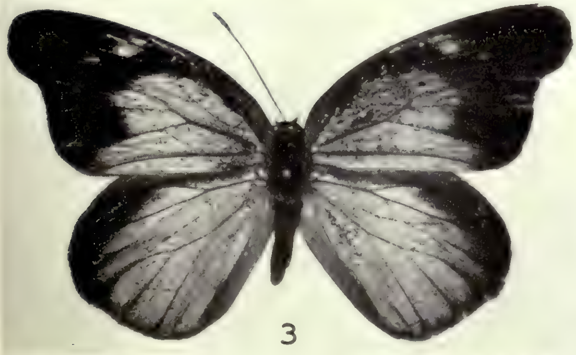

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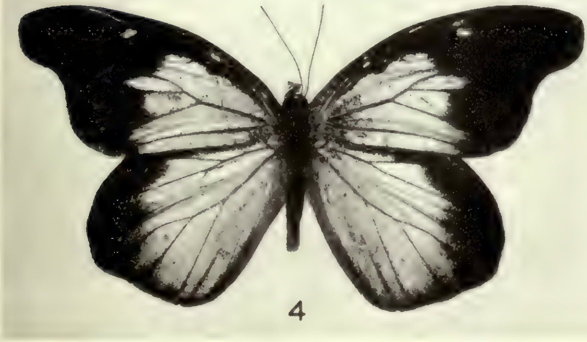

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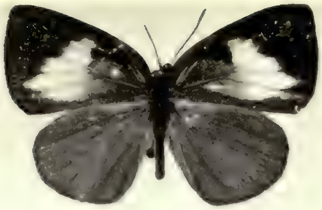

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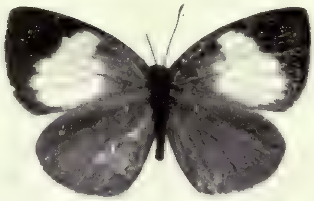

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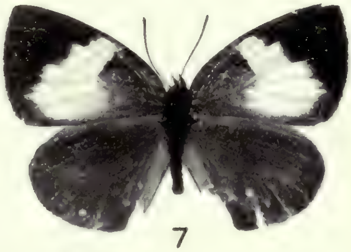

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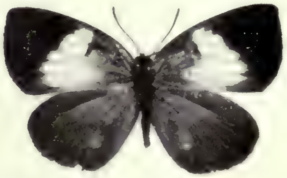

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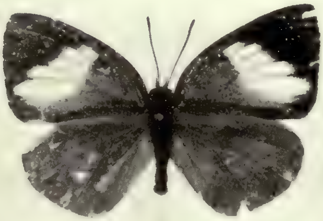

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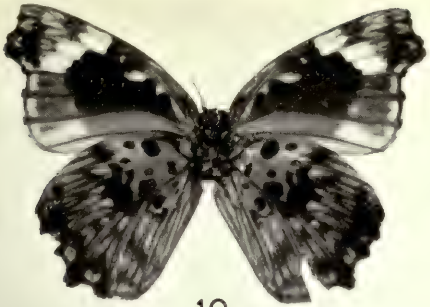
PLATE 2

FIGS. 10–18. Undersides of *Epitola :* (10) *miranda miranda* Staudinger neallotype female, (11) *miranda vidua* Talbot neallotype male, (12) *urania urania* Kirby neallotype female, (13) *urania tanganikensis* Joicey & Talbot neallotype female, (14) *moyambina* Baker neallotype female, (15) *intermedia* Roche neallotype female, (16) *convexa* Roche neallotype female, (17) *uniformis* Kirby neallotype female, (18) *insulana* Aurivillius neallotype female.



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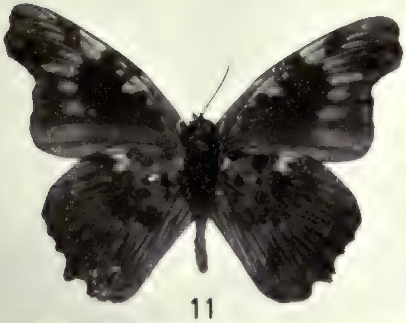

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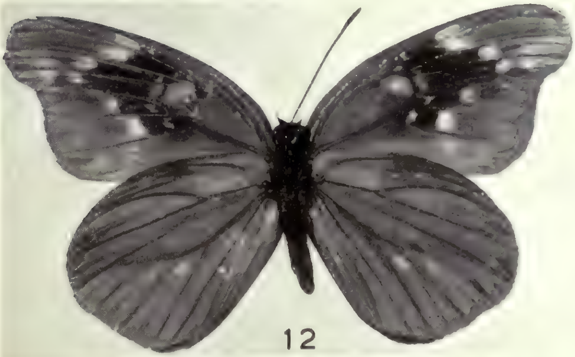

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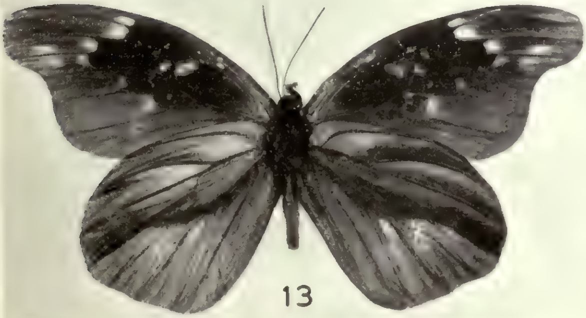

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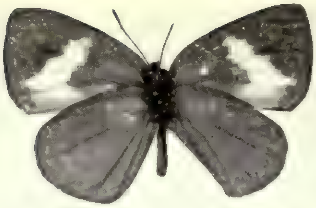

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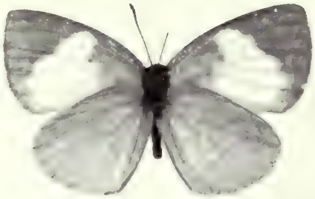

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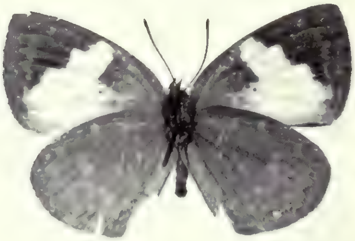

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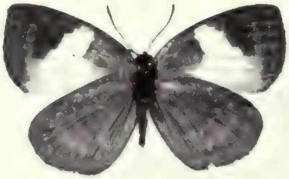

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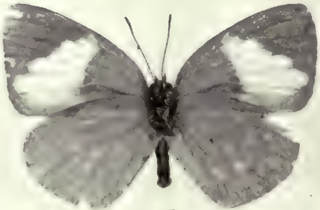

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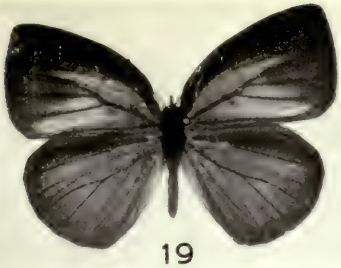
PLATE 3

Figs. 19–28. Uppersides of *Epitola :* (19) *staudingeri* Kirby neallotype female, (20) *mara* Talbot neallotype female, (21) *leonina* Staudinger neallotype female, (22) *nigrovenata* sp. n. holotype male, (23) *nigrovenata* sp. n. allotype female, (24) *tumentia* Druce neallotype female, (25) *elissa* Grose-Smith neallotype female, (26) *coerulea* sp. n. holotype male, (27) *coerulea* sp. n. allotype female, (28) *dunia* Kirby neallotype female.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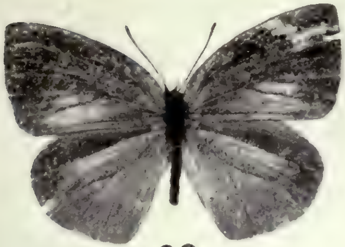
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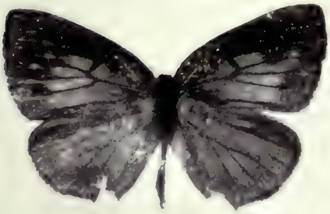
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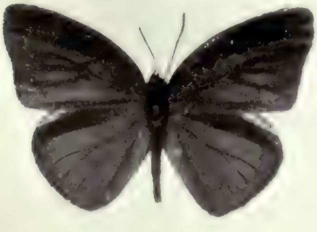
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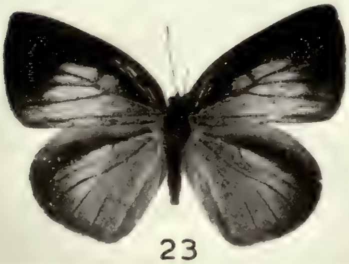
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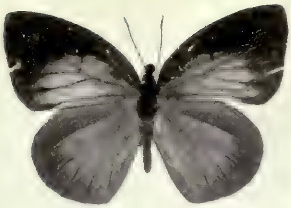
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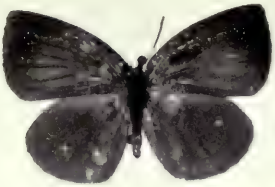
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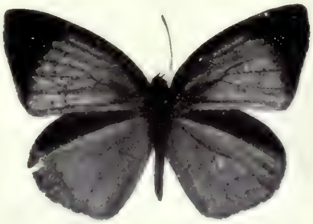
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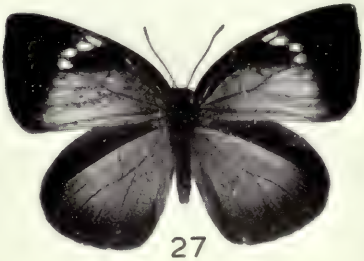
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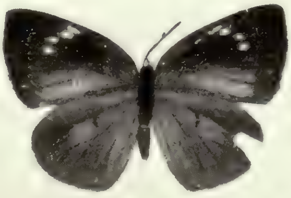
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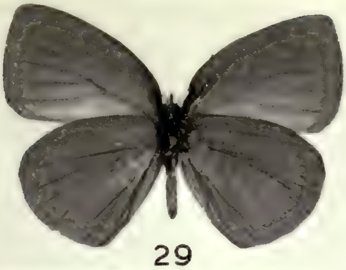
PLATE 4

Figs. 29–38. Undersides of *Epitola :* (29) *staudingeri* Kirby neallotype female, (30) *mara* Talbot neallotype female, (31) *leonina* Staudinger neallotype female, (32) *nigrovenata* sp. n. holotype male (33) *nigrovenata* sp. n. allotype female, (34) *tumentia* Druce neallotype female, (35) *elissa* Grose-Smith neallotype female, (36) *coerulea* sp. n. holotype male, (37) *coerulea* sp. n. allotype female, (38) *dunia* Kirby neallotype female.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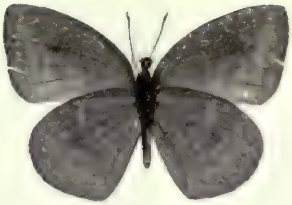
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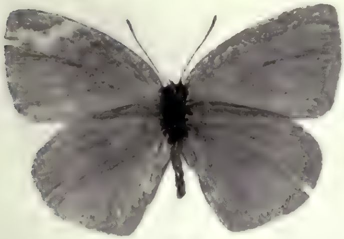
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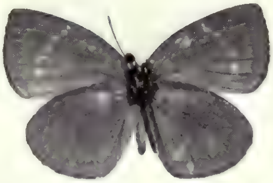
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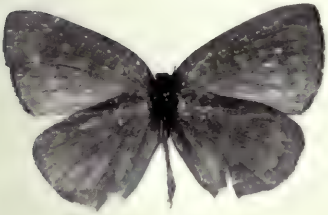
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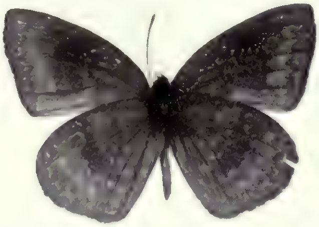
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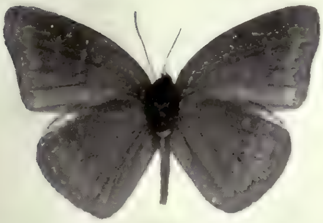
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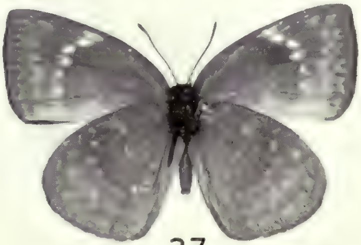
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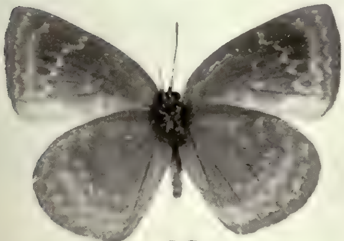
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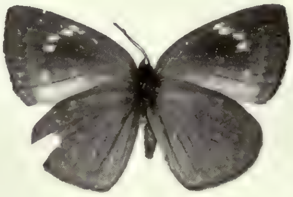
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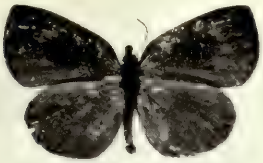
PLATE 5

FIGS. 39–48. Uppersides of *Epitola* : (39) *viridana viridana* Joicey & Talbot neallotype female, (40) *catuna* Kirby neallotype female, (41) *carpenteri* Baker neallotype female, (42) *orientalis* Roche neallotype female, (43) *ghesquieri* Roche neallotype female, (44) *nigeriae* sp. n. holotype male, (45) *nigeriae* sp. n. allotype female, (46) *cephena entebbeana* Baker neallotype female, (47) *mercedes* Suffert neallotype female, (48) *mpangensis* sp. n. allotype female.



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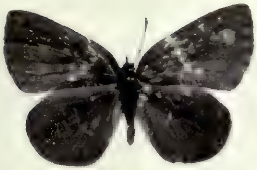

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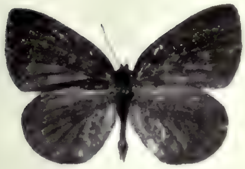

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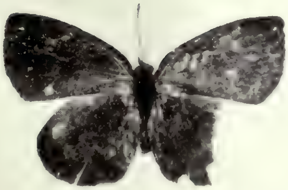

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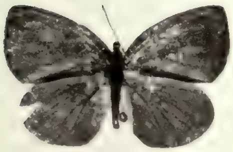

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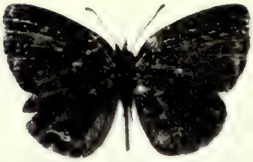

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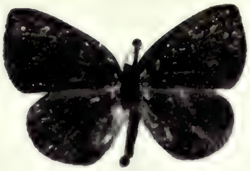

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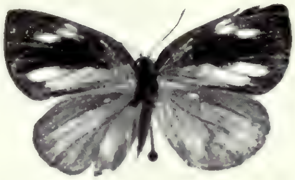

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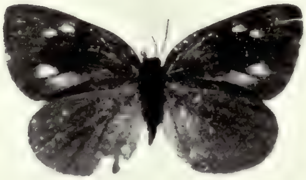

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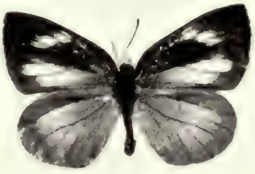

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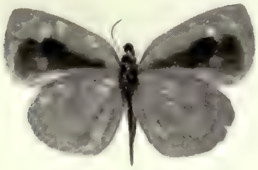
PLATE 6

Figs. 49–58. Undersides of *Epitola*: (49) *viridana viridana* Joicey & Talbot neallotype female, (50) *catuna* Kirby neallotype female, (51) *carpenteri* Baker neallotype female, (52) *orientalis* Roche neallotype female, (53) *ghesquieri* Roche neallotype female, (54) *nigeriae* sp. n. holotype male, (55) *nigeriae* sp. n. allotype female, (56) *cephena entebbeana* Baker neallotype female, (57) *mercedes* Suffert neallotype female, (58) *mpangensis* sp. n. allotype female.



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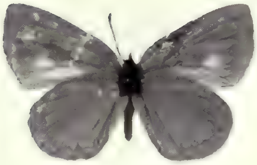

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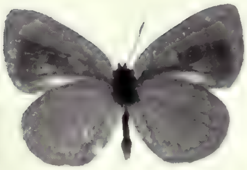

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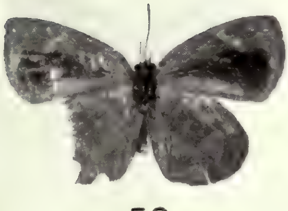

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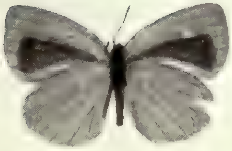

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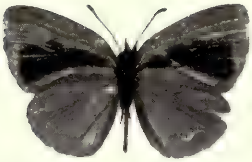

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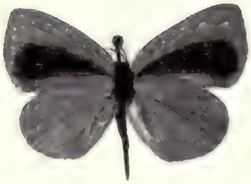

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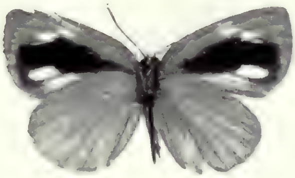

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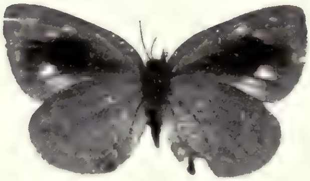

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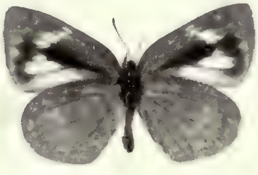
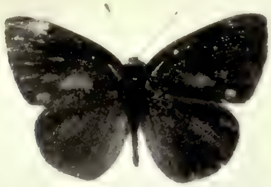


58

PLATE 7

FIGS. 59–68. Uppersides of *Epitola :* (59) *ouesso* sp. n. holotype male, (60) *ouesso* sp. n. allotype female, (61) *azurea* sp. n. holotype male, (62) *katerae* sp. n. holotype male, (63) *katerae* sp. n. allotype female, (64) *kamengensis* sp. n. holotype male, (65) *kamengensis* sp. n. allotype female, (66) *pseudoconjuncta* sp. n. holotype male, (67) *pseudoconjuncta* sp. n. allotype female, (68) *vinalli* Talbot neallotype female.



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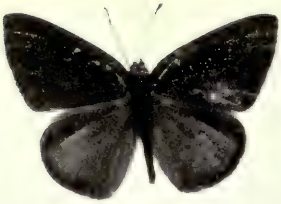

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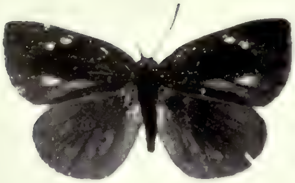

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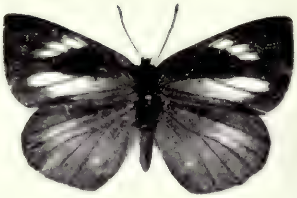

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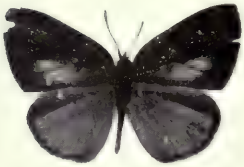

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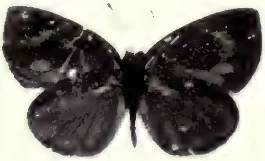

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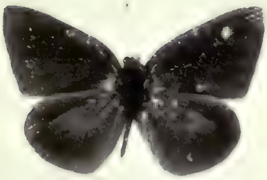

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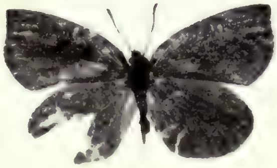

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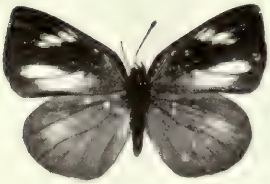

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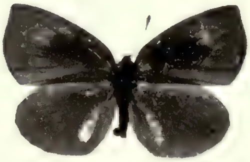
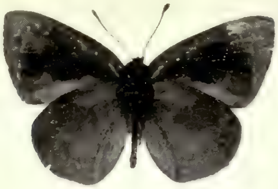


68

PLATE 8

FIGS. 69–78. Undersides of *Epitola* : (69) *ouesso* sp. n. holotype male, (70) *ouesso* sp. n. allotype female, (71) *azurea* sp. n. holotype male, (72) *katerae* sp. n. holotype male, (73) *katerae* sp. n. allotype female, (74) *kamengensis* sp. n. holotype male, (75) *kamengensis* sp. n. allotype female, (76) *pseudoconjuncta* sp. n. holotype male, (77) *pseudoconjuncta* sp. n. allotype female, (78) *vinalli* Talbot neallotype female.



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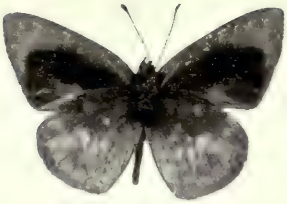

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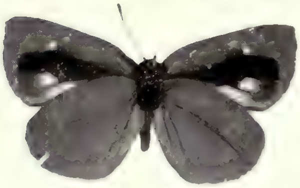

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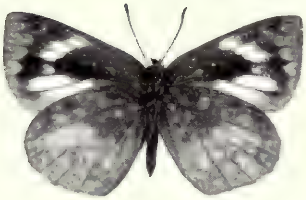

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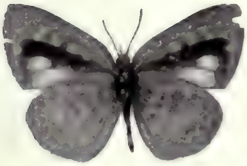

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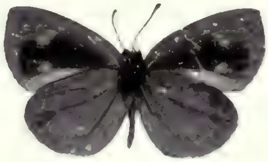

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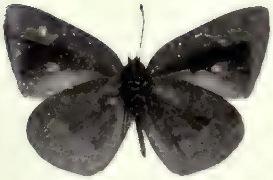

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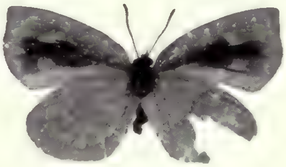

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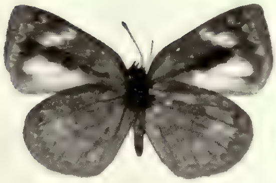

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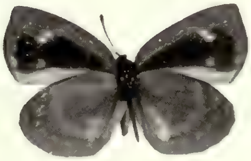
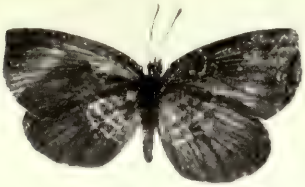


78

PLATE 9

FIGS. 79–88. Uppersides of *Epitola* : (79) *mengoensis* Baker neallotype female, (80) *barombiensis* Kirby neallotype female, (81) *alba* sp. n. holotype male, (82) *alba* sp. n. allotype female, (83) *carpenteri* Baker male, (84) *zelza* Hewitson male, (85) *urania urania* Kirby male, (86) *iturina* Joicey & Talbot male, (87) *dorothea* Baker male, (88) *insulana* Aurivillius male.



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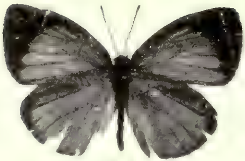

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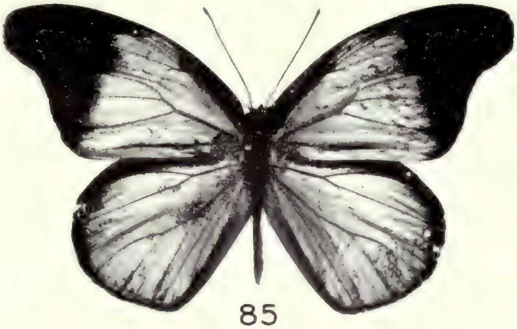

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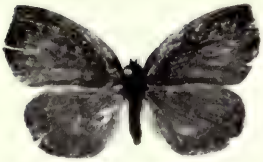

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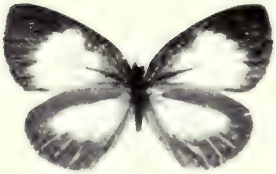

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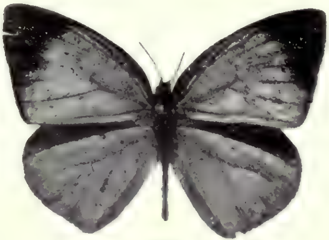

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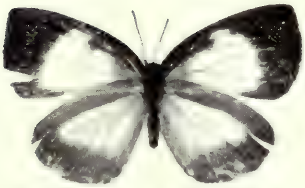

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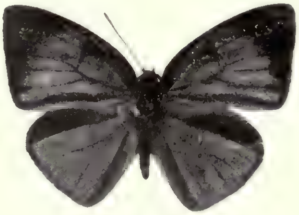

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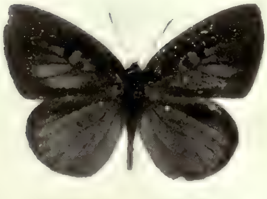

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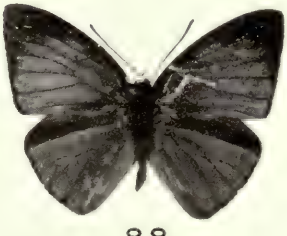
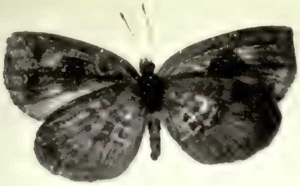


88

PLATE 10

FIGS. 89–98. Undersides of *Epitola* : (89) *mengoensis* Baker neallotype female, (90) *barombiensis* Kirby neallotype female, (91) *alba* sp. n. holotype male, (92) *alba* sp. n. allotype female, (93) *carpenteri* Baker male, (94) *zelza* Hewitson male, (95) *urania urania* Kirby male, (96) *iturina* Joicey & Talbot male, (97) *dorothea* Baker male, (98) *insulana* Aurivillius male.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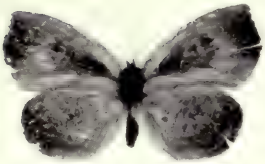
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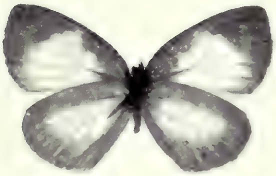
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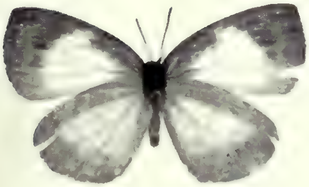
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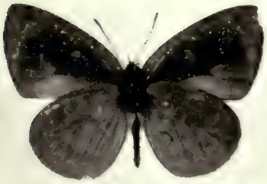
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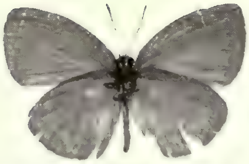
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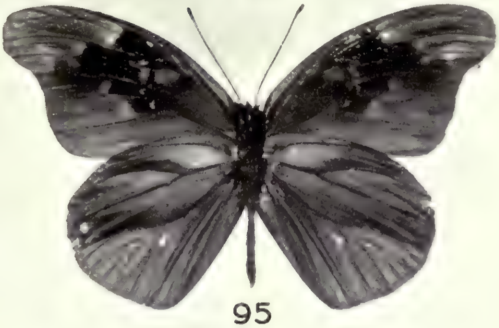
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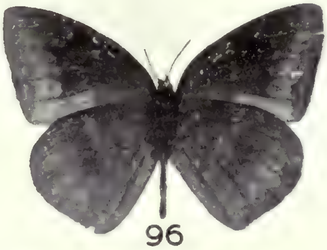
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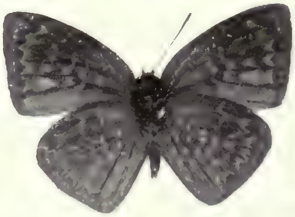
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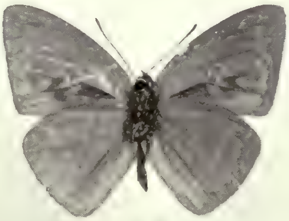
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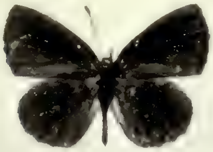
PLATE 11

Figs. 99–108. Uppersides of *Epitolina, Neaveia, Hewitsonia* and *Stempfferia :* (99) *E. catori ugandae* ssp. n. holotype male, (100) *E. catori ugandae* ssp. n. allotype female, (101) *N. lamborni orientalis* ssp. n. holotype male, (102) *N. lamborni orientalis* ssp. n. allotype female, (103) *Stempfferia carcassoni* gen. et sp. n. holotype male, (104) *H. boisduvalii nigeriensis* ssp. n. holotype male, (105) *H. boisduvalii nigeriensis* ssp. n. allotype female, (106) *H. similis ugandae* ssp. n. holotype male, (107) *H. similis ugandae* ssp. n. allotype female, (108) *Stempfferia carcassoni* gen. et sp. n. allotype female.



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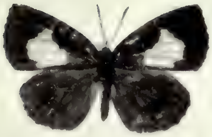

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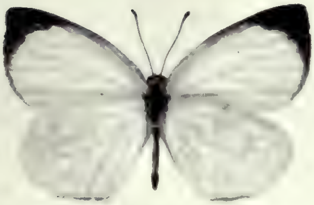

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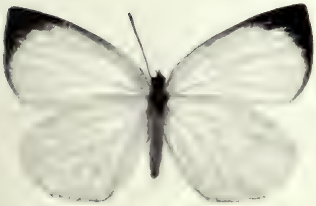

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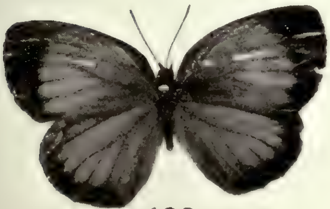

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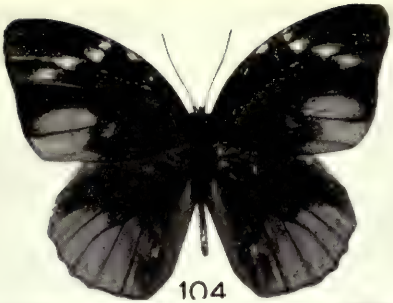

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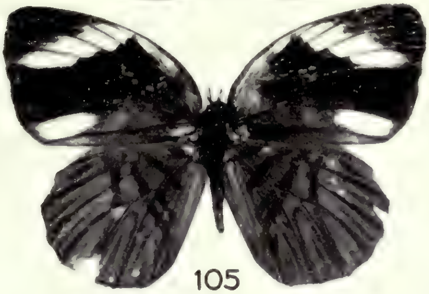

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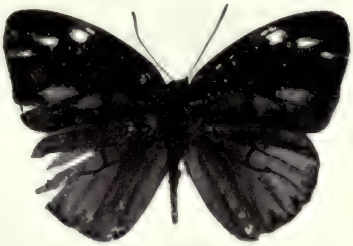

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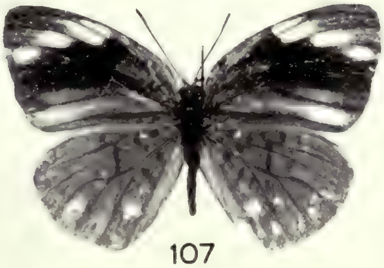

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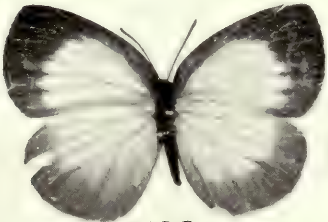
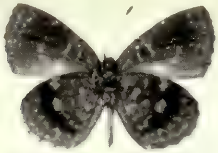


108

PLATE 12

FIGS. 109–118. Undersides of *Epitolina, Neavia, Hewitsonia* and *Stempfferia* : (109) *E. catori ugandae* ssp. n. holotype male, (110) *E. catori ugandae* ssp. n. allotype female, (111) *N. lamborni orientalis* ssp. n. holotype male, (112) *N. lamborni orientalis* ssp. n. allotype female, (113) *Stempfferia carcassoni* gen. et sp. n. holotype male, (114) *H. boisduvalii nigeriensis* ssp. n. holotype male, (115) *H. boisduvalii nigeriensis* ssp. n. allotype female, (116) *H. similis ugandae* ssp. n. holotype male, (117) *H. similis ugandae* allotype female, (118) *Stempfferia carcassoni* gen. et sp. n. allotype female.



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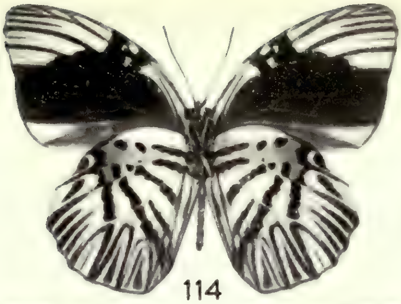

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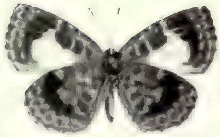

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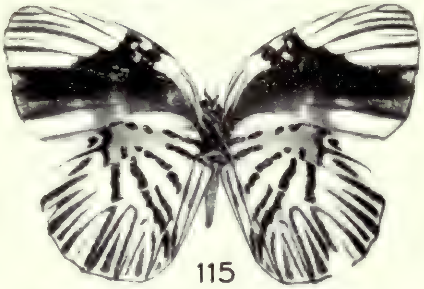

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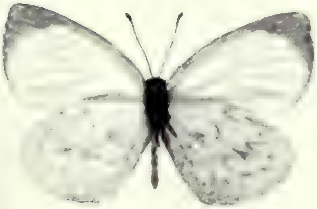

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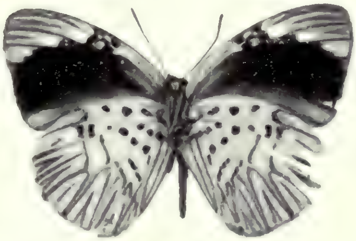

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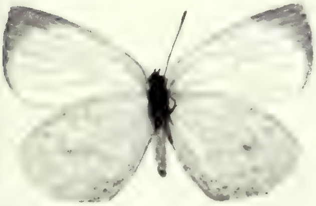

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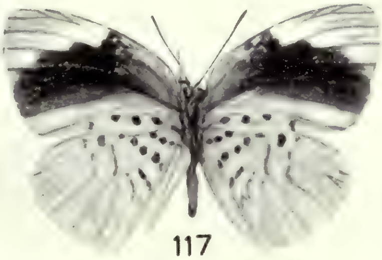

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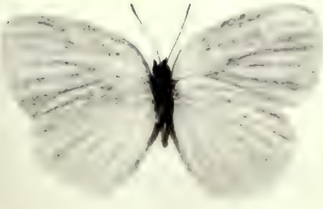

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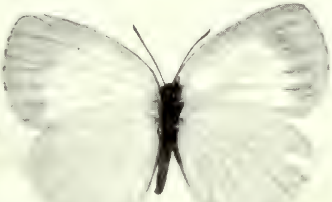

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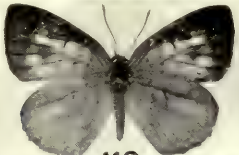
PLATE 13

FIGS. 119–130. Uppersides and undersides of *Epitola*: (119, 125) *liana* Roche neallotype female, (120, 126) *staudingeri aequatorialis* ssp. n. holotype male, (121, 127) *staudingeri aequatorialis* ssp. n. allotype female, (122, 128) *stempfferi* sp. n. holotype male, (123, 129) *stempfferi* sp. n. allotype female, (124, 130) *hewitsoni* Mabille holotype male.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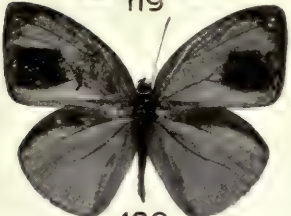
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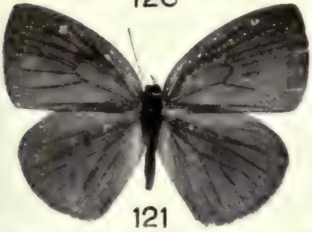
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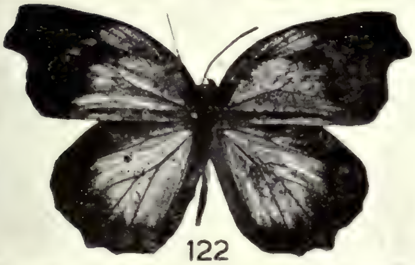
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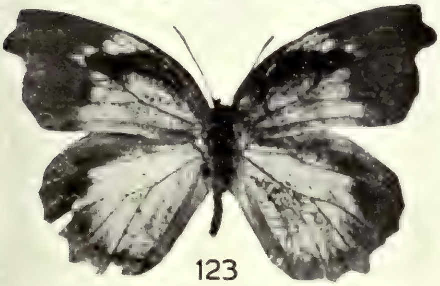
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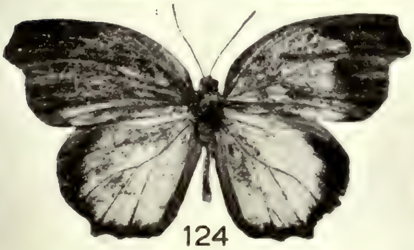
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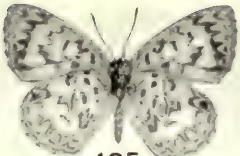
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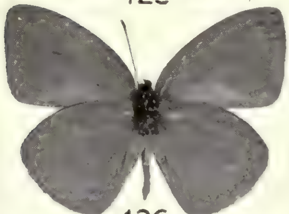
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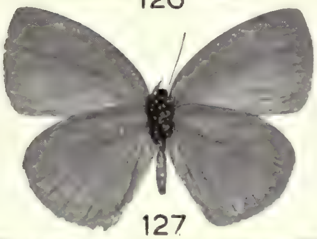
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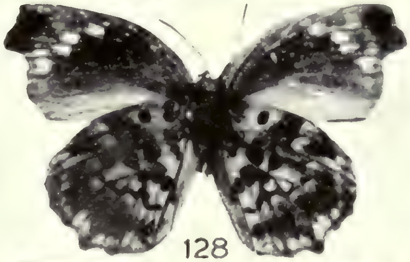
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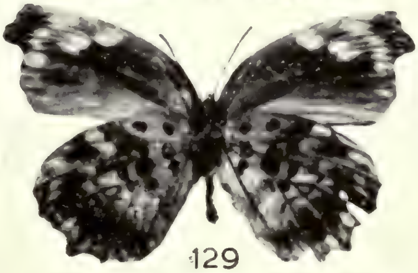
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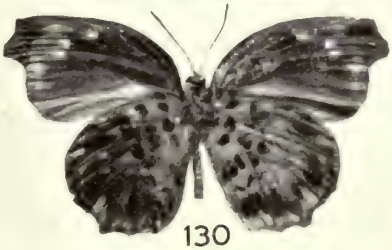
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A REVISION OF AFRICAN LAEMOPHLOEINAE (COLEOPTERA : CUCUJIDAE)

L. P. LEFKOVITCH

23 JUL 1962

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ENTOMOLOGY Vol. 12 No. 4
LONDON: 1962

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BY

L. P. LEFKOVITCH
Pest Infestation Laboratory, Slough

Pp. 165–245 ; 82 *Text-figures*

2 3 JUL

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A REVISION OF AFRICAN LAEMOPHLOEINAE (COLEOPTERA : CUCUJIDAE)

By L. P. LEFKOVITCH

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SYNOPSIS

Keys to, and descriptions of, sixteen genera, one subgenus and eighty-six species of Laemophloeinae from the Ethiopian region (including Madagascar, Madeira, the Canaries and the Salvages) and some North African species which are primarily Palaearctic are provided. Eight new genera, one new subgenus and thirty-nine new species are described ; two new generic and eleven new specific synonymies are made.

INTRODUCTION

IN a previous paper (Lefkovitch, 1959*b*), it was pointed out that *Laemophloeus* was a heterogeneous group. Based upon a study of species occurring in Europe, the genus was divided into more natural assemblages which were considered to merit generic status. Since a number of species of the Laemophloeinae are of economic importance, it was considered justifiable to extend the study of the group to those species not occurring in Europe. This paper is the first of such studies.

The species considered here are from the Ethiopian region including Madagascar (some species from Madagascar belong to a fauna whose affinities are with the Oriental or Pacific regions) and those apparently native to Madeira, the Canaries and the Salvages ; those North African species which are primarily European and represented in Mediterranean Africa but are here excluded are *Lathropus sepicola* (Müller), *Laemophloeus nigricollis* Lucas, *L. monilis* (Fabricius), *L. muticus* (Fabricius), *Notolaemus castaneus* (Erichson), *N. unifasciatus* (Latreille), *Cryptolestes duplicatus* (Waltl), *C. fractipennis* (Motschulsky), *C. corticinus* (Erichson), *Placonotus testaceus* (Fabricius), *Leptophloeus alternans* (Erichson), *L. juniperi* (Grouvelle), *L. hypobori* (Perris) and *L. clematidis* (Erichson) ; reference should be made to Lefkovitch (1959*b*) for a discussion of these.

There is one African species *Laemophloeus notabilis* Grouvelle, 1904 : 183, whose type specimens I have been unable to see and whose description is inadequate for its generic position to be established. It should be regarded as a species *incertae sedis* for the present. So far as I know, all other previously described species have been included.

The most interesting point that has arisen from the study of the African and European species of the subfamily (Lefkovitch, 1959*b*) is the difficulty in finding adult characters which would enable a tribal grouping of the genera. Quite clearly, *Cucujinus* Arrow, by its extreme flattening, the grooved prothoracic sublateral lines, the large contribution made by the metepisternum to the mesocoxal cavity and the curved suture between that sclerite and the metasternum, is distinct from the other genera. This degree of difference is such that the lack of apparent comparable differences between the other genera suggests that the appropriate phylogenetic characters are yet to be discovered. The recognition of these characters may be easier after a study of the Laemophloeinae in the remainder of the world. No tribal grouping of the genera will therefore be attempted at this stage.

Data relating to specimens consisting of " Miss. H. de Saeger " followed by a number are given in the appendix ; further details are given by de Saeger (1956). The specimens were collected in Garamba in the Congo.

GENERAL STRUCTURE OF ADULT LAEMOPHLOEINAE

HEAD. The head is perhaps the most obviously variable part of the body. The lateral lines, which when present (they are absent in *Lathropus*) have much the same structure as those of the pronotum, may often be joined anteriorly by a transverse line. In some genera, this transverse line is in fact a groove, which together with the median impressed line suggests the primitive Y-shaped epicranial sutures, e.g. Text-fig. 5. These sutures are not homologous with the ecdysial lines of immature stages of Coleoptera and the transverse suture is probably between the ante- and postclypeus and not between the frons and the clypeus. In some other genera the transverse line is raised and is obviously no more than a transverse continuation of the lateral lines. In some of these genera, examination by transmitted light reveals a transverse suture in the head which does not coincide with the transverse line. In the broadest terms, the shape of the head varies from truncated triangular to rectangular and can even be rostrate as in *Rhinolaemus*, *Rhinophloeus* and *Rhinomalus*. In general the gular sutures are visible in all the genera and are never confluent even in those genera (e.g. *Magnoleptus* gen. n.) which recall the Passandridae in their general appearance. The anterior angles of the genae are variable in the degree of development; in most genera they present no unusual features but in those genera in which males have a lateral expansion externally upon the mandibles, the genae are often enlarged proportionally. In males of *Passandrophloeus* the degree of development is such that mandibular development is quite clearly linked with that of the genae, which appear to prevent the mandibles from crossing too far in the median line (Text-fig. 39). Antennae vary to some extent in the subfamily; the scape, pedicel and three-segmented club may be considerably more robust than the intermediate segments (e.g. *Lathropus*); the degree of size differentiation is almost imperceptible in some genera; the antennal segments may even be quite elongate and a club completely indistinguishable. Sexual dimorphism may be apparent in the structure of the antenna. In males of many species in many genera, the antennal segments are elongate and there is no apparent club (e.g. Text-fig. 54), whereas those of females are shorter and a club is often quite distinct (e.g. Text-fig. 64). In addition, the male antennae may be as long as, or longer than the rest of the body whereas those of females of the same species are often equal to no more than half the body length. In some species the scape of the male is developed into an unusual form (Lefkovitch, 1958*b*); two species with such developments occur in the African region.

MOUTHPARTS. Laemophloeinae may be distinguished from other Cucujidae in that the lacinia is completely devoid of setae. As noted above, the mandibles may be produced laterally, resembling the condition in males of some species of *Uleiota*.

In this paper, " front of the head " refers to the dorsal margin between the antennal insertions, " epistome " to that part of the margin above the mouthparts.

PRONOTUM. In general, the pronotum is broader than long, although in *Leptophloeus* and *Narthecius* the reverse may hold. Normally the anterior angles are distinct but are less prominent than the posterior angles except in *Gannes* and some *Placonotus*. Each lateral line (stria of earlier authors) may consist of a simple raised ridge (e.g. Text-fig. 20) or it may be a double structure consisting of a raised ridge and an internal groove, the whole appearing as a single structure (e.g. Text-fig. 24). In some genera the groove may deepen behind the mid-point and form a deep fovea (e.g. Text-fig. 5). A line of punctures may be situated adjacent to the ridge externally, their outer margins sometimes running together to form what appears to be a second lateral line (e.g. Text-fig. 40). When such a condition holds, it is usually easy to decide which of the two lateral lines is the primary since the outer margin of the raised part of the primary line is continuous with the line adjacent to the anterior and posterior margins of the sclerite. In *Cucujinus* the lateral line is simply an elongate groove without any distinct edges, disappearing anteriorly and posteriorly before reaching the edge of the sclerite (Text-fig. 55).

ELYTRA. Punctured striae are typical and are probably always present. However, superimposed upon this puncturation there is in many genera a system of longitudinal raised areas. The position of these raised areas is quite constant. They occur in the first, third, fifth and seventh intervals of each elytron, but there is some variation between genera, and between the species in some genera, in the degree of elevation and in the lateral width. The regions enclosed by these raised areas, which are continuous both apically and basally, are called a cell for the purposes of this paper. The longitudinal raised region between the cells is here called a secondary interval. The secondary intervals may be quite narrow as in *Microlaemus* (Text-fig. 24) in which case the primary strial interval may then be considered to be carinate or just elevated ; or they may be broad as in *Magnoleptus*, where an accurate brief description of the primary interval may be difficult to give (Text-fig. 27). It is quite clear that each cell contains two rows of punctured striae and that any rows of punctures situated on a secondary interval do not represent striae (Text-fig. 1). Secondary rows of punctures may be present in the cells in addition to the striae, e.g. in *Cryptolestes capensis* which has one additional row and in *C. ferrugineus* which has two. A brief examination will often suffice to distinguish which rows of punctures are striae and which are secondary.

Ventral side of the thorax. The pro-episternal region is quite distinct and the suture between this sclerite and the prosternum often reaches the lateral margin of the prothorax. The pro-epimeron is often exposed and may close the anterior coxal cavity in conjunction with the intercoxal process of the prosternum (Text-fig. 38). The amount of closure of the anterior cavities is variable ; the cavities may be open posteriorly (Text-fig. 19), they may be closed by a meeting of the prosternum and epimeron either as points (Text-fig. 13) or in a broad front (Text-fig. 38). The prosternal process may be either very broad (Text-fig. 56) or very narrow (Text-fig. 21). It may be straight posteriorly, convex or concave. These features may be of

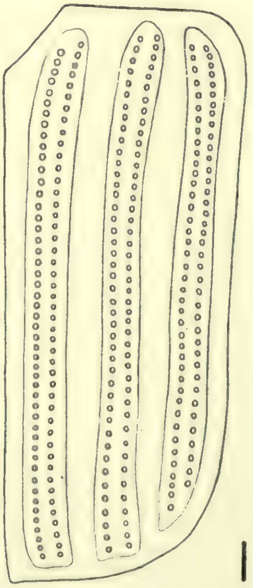


Fig. 1. Diagrammatic dorsal view of right elytron of typical Laemophloeinae.

value in a tribal classification, since they must be of importance in the kind of movement that the animal is able to make and thus of significance in the evolution of the group. There is some variation in the construction of the ventral side of the mesothorax in different genera. In most genera both the mesepisternum and the mesepimeron form part of the mesocoxal cavity, or if the mesepimeron does not, then it only just fails to do so. In many genera the metepisternum either does not contribute to the mesocoxal cavity (Text-fig. 15) or only just does so, but in *Cucujinus* the contribution of this sclerite is such that it forms an important part of the posterolateral margin of the cavity (Text-fig. 56).

The metasternum presents no special features except in the degree of definition of the median suture, and in the shape of that region in contact with the intercoxal process of the first visible abdominal sternite.

VENTRAL SIDE OF THE ABDOMEN. The intercoxal process of the first visible abdominal sternite has been considered by Lefkovitch (1959*b*); nothing further has been revealed by the African species of the subfamily. There is considerable variation in the overall shape of the five sternites which are visible, but it seems likely that this variation represents generic and not tribal differences. In general, either the first four visible sternites are as broad as each other or they become progressively narrower, the fifth sternite always being the narrowest. The first sternite is longest although the fifth sternite may be nearly as long as the first in some genera.

LEGS. The legs show a certain amount of variation although much of this is often specific in character. The trochantero-femoral junctions are usually of the normal type, but occasionally an approach to both the heteromeroid and the elongate type may be seen. The femora are often dilated, and, in very flattened species, the dilation may be considerable in one plane. The tibiae are usually slightly sinuate and bear two spines apically. In the peculiar *Laemophloeus mirificus* Grouvelle, these two spines are produced into setae which are equal in length to the combined lengths of the tarsal segments. The tarsi are usually five-segmented but may be four-segmented in the hind legs only, as in the males of many species. The basal four segments together are usually slightly longer than the terminal segment, but may be much shorter as in *Lathropus* Erichson, where the basal segments are shortened, or as in *Laemophloeus gestroi* Grouvelle where the terminal segments are considerably elongate in comparison with the usual condition. The terminal segment is never short. There is at most the very smallest indication of lobing of the segments ventrally.

(The generic attribution of *mirificus* and *gestroi* has not yet been established.)

KEY TO GENERA

1. Frontoclypeal suture situated at the base of a transverse groove 2
– Frontoclypeal suture either not situated at the base of a transverse groove or obsolete 4
2. Intercoxal process of the first abdominal sternite pointed anteriorly; anterior angles of the pronotum never produced into an acute tooth
LAEMOPHLOEUS Dejean[1]

---

[1] This genus is included in the key since although it is not represented in the Ethiopean region proper, it is represented in Mediterranean Africa: *supra* p. 168.

– Intercoxal process of the first abdominal sternite straight or slightly rounded anteriorly; anterior angles of the pronotum often produced into an acute tooth . . . 3

3. Elytra always covering the whole abdomen; last visible abdominal sternite in the mid-line at most only slightly longer than the preceding sternite; pronotum 1·3 times as broad as long; right mandible of male produced laterally and dorsally . . . . I. ***GANNES*** **gen. n.** (p. 174)

– Elytra leaving at least the tip of the abdomen exposed (Text-fig. 3), often the last segment is completely exposed dorsally; last visible abdominal sternite usually distinctly longer than the preceding sternite, often twice as long; pronotum usually quadrate or very slightly transverse; mandibles of the male without any lateral production . . . . . . II. ***PLACONOTUS*** Macleay (p. 176)

4. Head strongly produced anteriorly to the antennal insertions forming a distinct rostrum, this region being broad and flattened; pronotal lines strongly carinate; anterior coxal cavities widely open posteriorly; coxae very close together on each segment, separated by a distance equal to less than the width of a coxa; intercoxal process of the first visible abdominal sternite pointed anteriorly; antennae very short, hardly reaching the mid-point of the pronotum *Laemophloeus raffrayi* Grouvelle[1]

– Head only normally developed anteriorly to the antennal insertions or not produced at all; pronotal lines only weakly carinate; anterior coxal cavities either broadly or narrowly open, or closed posteriorly; coxae separated by a distance equal to or greater than the width of a coxa; intercoxal process of the first visible abdominal sternite never pointed anteriorly; antennae usually reaching at least the mid-point of the pronotum 5

5. Lateral lines on the head joined transversely just behind and very close to but distinct from the epistome by an almost straight but sometimes irregular line, this line possibly representing the frontoclypeal suture 6

– Lateral lines of head, if joined by a line, the line is not straight but clearly curved (or the line is the line of the epistome) 7

6. Labrum truncate or shallowly emarginate anteriorly; antennae usually inserted at the front corners of the head; eyes usually occupying slightly more than one-third of the lateral margin of the head measured from the front angles to the base III. ***XYLOLESTES*** **gen. n.** (p. 187)

– Labrum evenly rounded anteriorly; antennae usually inserted laterally on the head, behind the front corners; eyes usually occupying about one-quarter of the lateral margin of the head . . . . IV. ***XYLOPHLOEUS*** **gen. n.** (p. 189)

7. Lateral lines of pronotum never reaching its base (Text-fig. 55); head expanding laterally from base to just behind eyes, at widest usually broader than the pronotum; elytra leaving at least the last and often the preceding segments exposed XV. ***CUCUJINUS*** Arrow (p. 228)

– Lateral lines of the pronotum always reaching its base; head parallel-sided from base to eyes, at most as broad as the pronotum; elytra never leaving more than the tip of the pygidium exposed 8

8. Prothorax with suture between pronotum and pro-episternum visible dorsally; about 4 mm. in length and Carabid-like in general appearance; elytra with very distinct punctate striae (Text-fig. 20) . . . V. ***BLUBOS*** **gen. n.** (p. 194)

– Prothorax with suture between pronotum and pro-episternum not visible dorsally or if so, beetles cylindrical, resembling some Colydiidae and about 2 mm. in length; elytra with less distinct punctate striae 9

9. Epistome either rounded, truncate, or with a single medial spine anteriorly or with two teeth (Text-figs. 28–30) or, if with one emargination, either the mesepimera

---

[1] This species does not belong to the Cucujidae and a detailed study has failed to show its proper family position. It is included here since it was originally described as a *Laemophloeus* and could possibly be misidentified as a Laemophloeine (see Lefkovitch, 1962).

contribute to the mesocoxal cavities or the body is never longer than 3 mm. and the clypeus is rarely produced into horns in males 10

– Epistome with three or five emarginations or, if with one emargination, either the mesepimera do not contribute to the mesocoxal cavities or the clypeus is always produced into horns in the males (Text-fig. 54) and the body is usually 3 mm. or more in length 15

10. Frontoclypeal suture represented by a line strongly curved away from the mouthparts (Text-fig. 24) (in the smallest species, this line is not easily seen) ; a dark mark is present anteriorly on the lateral lines of the head at the junction between the lines and the frontoclypeal suture ; first visible abdominal sternite 2·5 times as long as the second sternite in the mid-line ; last visible abdominal sternite 1·5 times as long as the preceding sternite . VI. ***MICROLAEMUS*** **gen. n.** (p. 196)

— Frontoclypeal suture obsolete ; no dark marks anteriorly on the lateral lines of the head ; first visible abdominal sternite usually only twice as long as the second sternite in the mid-line ; last visible abdominal sternite only rarely longer than the preceding sternite 11

11. Body almost cylindrical ; antennae less than half the body length in both sexes ; head and pronotum never with two carinae on each side 12

— Body more flattened in section ; antennae in female just less than half the body length or longer, in male often considerably longer than those of the female, often either as long as the body, or head and pronotum with two lines on each side, or these characters combined 14

12. Head longitudinally grooved on each side of a median epistomal horn
IX. ***NARTHECIUS*** Leconte (p. 210)

— Head, if with a median epistomal horn, not longitudinally grooved on each side of it 13

13. Larger beetles, 3·5–5·0 mm. in length ; male tarsal formula 5–5–4 ; body usually black or reddish black in colour . . . VII. ***MAGNOLEPTUS*** **gen. n.** (p. 199)

— Smaller beetles, 1·8–3·0 mm. in length ; tarsal formula in both sexes 5–5–5 (except in two species where it is 5–5–4) ; body usually brown in colour
VIII. ***LEPTOPHLOEUS*** Casey (p. 201)

14. Anterior coxal cavities with broad transverse extensions laterally (Text-fig. 38) ; head with two lateral lines on each side ; mandibles of male produced laterally and ventrally (Text-fig. 39) ; genal horns strongly developed, especially in males
X. ***PASSANDROPHLOEUS*** Kessel (p. 213)

— Anterior coxal cavities with narrow lateral transverse extensions ; head rarely with two lateral lines on each side, usually with one ; mandibles of the males of some species produced laterally but never ventrally ; genal horns weakly developed
XVI. ***CRYPTOLESTES*** Ganglbauer (p. 231)

15. Front of head with a deep emargination just internal to the antennae (Text-fig. 43) ; five distinct emarginations exist between the insertions of the antennae
XI. ***MESTOLAEMUS*** **gen. n.** (p. 215)

— Front of head only shallowly emarginate just internal to the antennae ; only one distinct emargination exists anteriorly on the head, that over the mouthparts ; very shallow more lateral emarginations may be present in larger species, but a deep emargination just medial to the antennae is never present . . . 16

16. Intercoxal process of the first visible abdominal sternite evenly rounded anteriorly and without a straighter median section ; frons produced anteriorly into two horns in males (in one species only the left horn is developed), these horns apparently being formed by the production of the external angles of the single epistomal emargination (Text-fig. 54) ; elytra carinate laterally, with secondary intervals well developed and continuing to the apices ; the secondary intervals may be as broad as the cells or narrower ; beetles larger, 2·3–3·5 mm. in length (associated with Legume pods) . . . . XIV. ***PLANOLESTES*** Lefkovitch (p. 226)

— Intercoxal process of the first visible abdominal sternite rounded and with a straighter median section ; frons not produced anteriorly into horns in either sex ; elytra carinate or non-carinate laterally, if with raised secondary intervals then either the elytra become flat apically or the secondary intervals are always as broad as the cells ; beetles usually smaller, 1·5–2·5 mm. in length, if larger, then usually three emarginations are present anteriorly on the head 17

17. Posterior border of intercoxal process of prosternum concave for reception of mesosternum (Text-fig. 44) ; elytra not carinate laterally ; beetles more convex in section and body rather short ; elytra with only one raised interval, recurved near the humeral angle and with faint punctured striae ; scutellum semi-elliptical ; internal angle of metepisternum not contributing to the mesocoxal cavity, i.e. mesepimeron and metasternum in contact with each other . XII. ***MARIOLAEMUS* gen. n.** (p. 216)

— Posterior border of intercoxal process of prosternum evenly rounded (Text-fig. 53) ; elytra carinate laterally ; beetles flattened in section and body longer ; elytra with at least two raised intervals in addition to the punctured striae ; scutellum triangular ; metepisternum contributing to the mesocoxal cavity, i.e. mesepimeron separated from metasternum by the anterior angle of the metepisternum XIII. ***NOTOLAEMUS*** Lefkovitch (p. 220)

DESCRIPTIONS OF GENERA AND SPECIES

I. *GANNES* gen. n.

Type species : *Gannes immoderatus* sp. n.

This genus is most closely related to *Placonotus* Macleay. It is distinguished from that genus by the characters given in the key (p. 172).

About 2 mm.; body flattened.

Head transverse ; eyes large, usually in contact with prothorax ; frontoclypeal suture distinct and situated at the base of a groove ; epistome truncate ; lateral line distinct and forming part of the dorsal margin of eye ; antennae about as long as body in *male*, shorter in *female*, in *female* there is a loose three-segmented club ; *males* with right mandibles produced laterally and dorsally.

Pronotum distinctly transverse, narrowing somewhat basally ; anterior and posterior angles acute but hardly, if at all, produced ; lateral line distinctly raised and with an accompanying depression, the line not punctured or foveolate along its length.

Scutellum semicircular ; *elytra* carinate laterally, with the third cell complete (see p. 170) and two other raised intervals.

Genae normal ; *gular* sutures obsolete ; anterior *coxal cavities* closed posteriorly, circular and widely separated ; intercoxal process of the prosternum slightly convex posteriorly ; *mesepimera* not contributing to the mesocoxal cavities (Text-fig. 2) ; *metasternum* equal in length to the first two abdominal segments ; intercoxal process of first abdominal segment almost straight anteriorly ; first visible abdominal sternite 1·5 times as long as the second sternite, second, third and fourth sternites about equal to each other, fifth slightly longer ; legs subequal ; trochantero-femoral junctions of normal type ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

KEY TO SPECIES

1. Head with punctures very slightly less in diameter than facets of eyes, separated by a polygonal micro-reticulation ; discal setae about 2·5 times as long as diameter of a puncture ; fifth antennal segment in males longer than the scape 2. ***ambiguus*** (Grouvelle) (p. 175)

– Head with punctures much less than an eye facet in diameter (about 0·25 times), separated mainly by smooth cuticle but with small areas of irregular micro-reticulation ; setae about 5 times as long as the diameter of a puncture ; fifth antennal segment in males shorter than the scape . 1. ***immoderatus*** sp. n. (p. 175)

1. ***Gannes immoderatus*** **sp. n.**

(Text-fig. 3)

1·9–2·3 mm.; body reddish yellow to blackish red in colour ; elytra somewhat more yellow than the head and pronotum.

Head across eyes nearly as wide as pronotum at its widest ; frontoclypeal suture evenly curved posteriorly ; epistome rounded anteriorly ; antennae as long as body in *male*, shorter in *female* ; last three segments somewhat enlarged ; head simply punctured, with a micro-reticulation, punctures separated by one to two diameters, each subtending a seta equal to five punctures in length ; *pronotum* with puncturation and setation as on the head ; *elytra* somewhat oval, broadest about a third of their length from the base and narrowing apically, evenly rounded to apico-sutural angle.

CONGO, UGANDA.

HOLOTYPE male " Yangambi 1953. C. Donis z.2634 (= *Synsepalum dulciferum* Sch. and Th. : Sapotaceae) coll. R. Mayné. Com. et Bois Congo. R2439 " (Mus. R. Congo Belge) ; 1 paratype with same data as holotype except with z.2992 and R2440 ; 1 paratype with same data as holotype but with z.2672 (Mus. R. Congo Belge) ; 2 paratypes " Uganda Kampala 25.vii.1927 H. Hargreaves " (British Museum (Natural History)).

2. ***Gannes ambiguus*** (Grouvelle) **comb. n.**

Laemophloeus ambiguus Grouvelle, 1923.

This species differs from *G. immoderatus* sp. n. in that the setae on the head and pronotum are considerably shorter, the elytra are less narrowed apically, and the epistome is truncate whereas that of *G. immoderatus* is rounded anteriorly.

1·8–2·3 mm.; body yellow to blackish red in colour.

Head across eyes as wide as or slightly narrower than pronotum ; frontoclypeal suture evenly curved posteriorly ; epistome truncate anteriorly ; antennae as long as the body in *male* and the last three segments not forming a club, in *female* antennae shorter than body and last three segments forming a loose club. Head evenly punctured, punctures separated by one diameter, micro-reticulated between the punctures ; setae equal in length to 2·5 times diameter of one puncture. *Pronotum* with puncturation and setation as on head. *Elytra* less narrowed apically than in *G. immoderatus* sp. n., evenly rounded to apico-sutural angle.

EAST AFRICA, CONGO.

HOLOTYPE female " Afrique orient. anglaise Forêt de Nairobi Alluaud et Jeannel Nov.–Dec. 1911—1700—St 11 " (Grouvelle coll.). Other specimens seen include : 1 " Benito. Congo Franc. sp. nv." ; 1 " Ogoove Lambarene R. Ellenberger 1911 " 1 " Af. or. All. Amani/Eichelbaum/*Laemophloeus testaceus* F var A inéd " (Grouvelle collection, Muséum National d'Histoire Naturelle, Paris) : 1 " Congo Belge M2 Kahuzi S7 111. 22–viii–1952. Dr. Schedl. s.708 " ; 1 " Recolté dans l'humus/ I.R.S.A.C.—Mus. Congo Kivu : Terr. Uvira, Mulenga 1880–2010 m. (Vest. for.

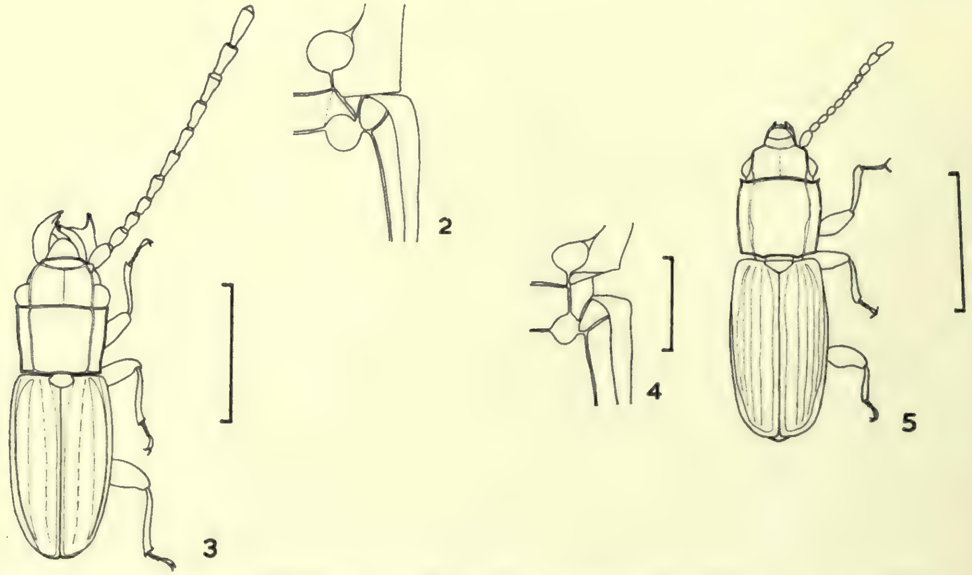
ombroph.) V-1951. N. Leleup." ; 1 " S/L'écorce de *Canarium Schweinfurthi*/Coll. Mus. Congo. Bas-Congo : Sanda. Courtois." ; 1 " Eala vii–1935. J. Ghesquière " ; 1 " A la lumière I.R.S.A.C.—Mus. Congo. Kivu : Terr. Masisi, 720 m Walikale (River Loa) xi–53. N. Leleup " ; 1 " Elisabethville –ii–1940 H. J. Brehdo " ; 2 " Kivu : Buranga 5–xii–1925 and 9–xii–1925. Dr. H. Schouteden " ; 3 " Yangambi, 1952. C. Donis. z3032 (*Synsepalum dulciferum* Sch. and Th. : Sapotaceae) " ; Miss. H. de Saeger, 3 (3649), 1 (3519), 2 (3736), 1 (3738), 1 (2601), 2 (3379) (see Appendix) (Mus. R. Congo Belge) ; 1 " Uganda. Ruwenzori Range. Mahoma River 6,700 ft. 13–16.viii.1952. D. S. Fletcher " ; 1 " R. E. Dent. Charia R.7800. July, 1929 " ; 1 " Ngong Forest in *Boletus*. Nairobi B.E. Africa 4.x.1920. A. F. J. Gedye " ; 4 " Port St. John. Pondoland Sept. 1923. R. E. Turner " ; 3 " Belgian Congo 18 m. sw of Elizabethville 13.xi.1927. Dr. H. S. Evans " ; 2 " Nairobi .xi.1920 " ; (British Museum (Natural History)) ; 2 " Mt. Elgon O(st) A(frika) 2200 m. iv–25 leg Alinder" (Zoologische Sammlung des Bayerischen Staates, Munich).

II. ***PLACONOTUS*** Macleay

(Text-fig. 5)

Placonotus Macleay, 1871.
Silvanophloeus Sharp, 1899.

Type species : *Placonotus longicornis* Macleay (by monotypy).



Figs. 2–5. (2) Front and middle coxal cavities of *Gannes immoderatus* ; (3) dorsal view of *G. immoderatus* ; (4) front and middle coxal cavities of *Placonotus testaceus* (F.) ; (5) dorsal view of *P. testaceus*.

Scale lines : Figs. 2, 4 = 0·25 mm. ; Figs. 3, 5 = 1 mm.

A redescription of this genus is given by Lefkovitch (1959*b*). In addition to the characters indicated there, the following should be noted : Lateral line on *head* formed by raised ridge ; that of *pronotum* by a groove with outer margin slightly raised to form a weak ridge ; *genae* normally developed ; *gular* sutures obsolete ; hind border of prosternal process convex posteriorly ; anterior *coxal cavities* circular ; *metepisternum* not contributing to mesocoxal cavity but both *mesepisternum* and *mesepimeron* do ; posterior border of *mesosternum* straight ; trochantero-femoral junctions of normal type.

The structure of the male genitalia presents points of interest in this genus. Two pairs of claspers are present which appear to be derived from the sclerites of the tenth abdominal segment. The tergite may be partially or completely divided along the median line to form two elongate rods ; the sternite is always divided and articulated at its proximal end. Internally, the two sclerites may be tuberculate posteriorly. The protrusion of these claspers gives the impression that they are ovipositors ; several specimens labelled by their collectors as females were found to be males with projecting claspers.

KEY TO AFRICAN SPECIES

1. Anterior angles of pronotum acute (Text-fig. 6) 2
– Anterior angles of pronotum rounded (Text-fig. 7) 12
2. Black or reddish black in colour, without a lighter mark on each elytron ; epistome truncate anteriorly . . . . 1. **tastus** sp. n. (p. 178)
– Head and pronotum brown or yellowish in colour, or if black, then each elytron with a lighter mark at basal third ; epistome emarginate anteriorly . . . 3
3. Elytra unicolorous 4
– Elytra with a lighter mark at basal third 11
4. Smaller species (about 1·5–2 mm.) ; pronotum distinctly transverse and head punctate ; elytra 2·5–3·0 times as long as their combined width 5
– Larger species (about 1·8–2·3 mm.) ; pronotum about as broad as long or if transverse, then head impunctate ; elytra usually less than 2·5 times as long as their combined width 6
5. Epistome concave . . . . 2. **dolce** sp. n. (p. 178)
– Epistome convex . . . . 3. **mestus** sp. n. (p. 179)
6. Disc of head impunctate but strongly reticulate . . . 13. **mossus** sp. n. (p. 187)
– Disc of head punctured 7
7. Disc of head polygonally reticulate between punctures 8. **donacioides** (Wollaston) (p. 183)
– Disc of head smooth or with irregular groove-like markings between punctures . 8
8. Elytra rounded together posteriorly (Text-fig. 8) . . 4. **majus** sp. n. (p. 179)
– Elytra separately rounded to apico-sutural angle, semitruncate (Text-fig. 9) . . 9
9. Ventral claspers of male weakly developed (Text-fig. 10) 6. **ealaensis**[1] sp. n. (p. 182)
– Ventral claspers of male strongly developed 10
10. Ventral claspers straight posteriorly ; dorsal claspers incompletely divided, in shape together equivalent to a normal tenth tergite (Text-fig. 11) 5. **subtruncatus**[1] sp. n. (p. 181)
— Ventral claspers spatulate posteriorly ; dorsal claspers completely divided except for a narrow strut anteriorly, posteriorly no broader than ventral claspers (Text-fig. 12) . . . . 7. **africanus**[1] sp. n. (p. 182)
11. Head and pronotum reddish brown . . . . . 12. **exornatus** (Grouvelle) (p. 186)
— Head and pronotum black . . . . . . 11. **decoratus** (Grouvelle) (p. 186)
12. First visible abdominal sternite with femoral lines ; pronotum convex between lateral lines ; anterior angles of pronotum not produced (Text-fig. 7) 9. **politissimus** (Wollaston) (p. 183)

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[1] Good characters for the separation of females have not been discovered.

— First visible abdominal sternite without femoral lines ; pronotum almost flat between the lateral lines ; anterior angles of pronotum somewhat produced
10. **bolivari** (Grouvelle) (p. 185)

1. *Placonotus tastus* sp. n.

(Text-fig. 6)

2 mm. ; body reddish black in colour, elytra less black than the head and pronotum ; shining but not brilliantly.

Head somewhat transverse, eyes large slightly in advance of base ; frontoclypeal suture with a raised ridge anterior to the shallow groove ; epistome truncate anteriorly ; antennae as long as body in *male* ; disc evenly punctured, punctures separated by a distance equal to two to three diameters ; each puncture subtends a seta equal to about one diameter in length ; laterally on disc the intervals between punctures micro-reticulate, medially less so ; frons punctured just anterior to frontoclypeal suture but only reticulate just behind epistome.

Pronotum very slightly transverse and slightly narrowed basally, at its broadest slightly narrower than head ; anterior angles acute and produced, posterior angles obtuse ; disc with a small shallow depression on each side just anterior to the fovea included in lateral line ; disc with puncturation and setation as on disc of head ; region between lateral line and lateral margin with more distinct micro-reticulation than on disc.

Elytra slightly broader across shoulders than pronotum at broadest ; 2·5 times as long as their combined width ; parallel-sided anteriorly but narrowing somewhat towards apices from about mid-point ; third cell developed basally, with part of first cell developed at about mid-point ; punctate striae present and complete until just before the apical region where they are obsolete ; each elytron subtruncate apically, their combined median regions being straight ; surface with micro-reticulation between punctures and lines.

Female unknown.

ETHIOPIA.

HOLOTYPE male " Abyssinia : Djem-Djem Forest. circa 8000 ft. 25–29.ix.1926. Dr. H. Scott." (British Museum (Natural History)).

This species is most clearly distinguished from other *Placonotus* in its colour which is a very dark red or a slightly reddish black. In addition, the truncate epistome is unique amongst the African species of the genus having acute anterior angles to the pronotum.

2. *Placonotus dolce* sp. n.

This species can be distinguished from other *Placonotus* in that it is quite small, the pronotum transverse, the ratio of length of elytra to their combined breadth is between 2·5 and 3 and has interesting double puncturing on the discs of both the head and the thorax.

1·5–2·0 mm. ; body brownish red in colour.

Head transverse ; eyes about half a diameter in advance of base of head ; frontoclypeal suture with a slight raised ridge anterior to deep groove ; epistome shallowly emarginate anteriorly ; antennae about 0·75 times length of the body in *male*, shorter in *female* ; antennae of *female* with last three segments slightly enlarged to form a loose club, in *male* these segments more elongate than those preceding but not broadened laterally ; disc of head with punctures of two sizes, the larger with diameter equal to slightly more than that of eye facet, the smaller being equal to half or less than this diameter ; the larger punctures separated by a distance equal to one to two diameters, each subtending a seta equal in length to two diameters ; the smaller punctures irregularly and sparsely scattered between larger ; head without micro-reticulation between punctures but smooth and shining.

Pronotum 1·25 times as wide as long, at its broadest slightly broader than head ; anterior angles acute and slightly produced, posterior angles acute ; lateral margin with twelve small teeth, those anterior being further separated from each other than those posterior ; puncturation and setation similar to that of head ; fovea of lateral line deep.

Elytra at shoulders slightly broader than pronotum ; 2·5–3·0 times as long as their combined width, hardly narrowing apically ; not or only weakly carinate laterally ; with three cells weakly developed but hardly visible apically and basally ; striae distinct ; each elytron separately rounded to apico-sutural angle ; without micro-reticulation between punctures.

CONGO.

HOLOTYPE male " Dans terreau, au Berlese/Kivu : Terr. Lubero, confl. Munobo et Lubero, 1880 m. R. P. M. J. Celis ix–1954 " and allotype with the same data (Mus. R. Congo Belge).

3. ***Placonotus mestus*** **sp. n.**

This species resembles *P. dolce* sp. n., differing as follows : *head* and *pronotum* with punctures separated by once to twice their diameter, without micro-puncturation, with micro-reticulation between punctures at least peripherally on disc ; epistome convex anteriorly ; eyes situated very close to thorax ; elytra no broader across shoulders than pronotum, markedly narrowing apically, clearly carinate laterally.

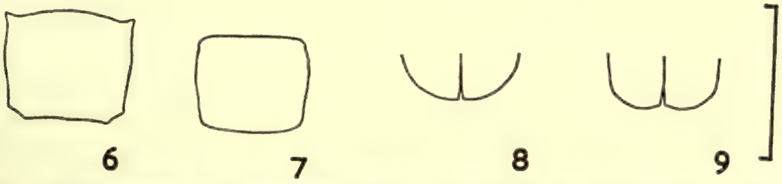
SIERRA LEONE, CONGO.

HOLOTYPE male and 15 paratypes " Bas-Uele : Kotell 1/21–i–1925 Dr. H. Schouteden ". Other paratypes : 1 " Mongende 13–iv–1921 Dr. H. Schouteden " ; 3 " Eala viii–1935 J. Ghesquière " ; 1 " Katanga : Katompe 1/15–vi–1930 Dr. P. Gerard " ; 1 " Recolté sous écorce d'*Hevea* Yangambi v–1952 J. Decelle " ; 1 " Luki 5–xi–1952 R. Mayné R.M.1." ; 3 " Yangambi 1951 C. Donis z.3–17, z.802 and z.1368 " (Mus. R. Congo Belge) : 2 " Sierra Leone Njala 4–i–1933 E. Hargreaves. Under bark of dead rubber " (British Museum (Natural History)).

4. ***Placonotus majus*** **sp. n.**

(Text-fig. 8)

This species resembles *Placonotus tastus* sp. n. but differs in that its body colour is less dark, in the possession of the small longitudinal impressions between the



FIGS. 6–9. (6) Pronotum of *Placonotus tastus* and (7) of *P. politissimus* ; (8) elytral apices of *P. majus* and (9) of *P. subtruncatus*.

Scale line = 0·25 mm.

punctures of the disc of the head and prothorax, in the greater narrowing of the pronotum basally in addition to the emarginate epistome.

2·0–2·5 mm. ; body ferrugineous in colour.

Head transverse ; eyes about half a diameter in advance of base ; frontoclypeal suture with an anterior ridge and a shallow groove ; epistome emarginate anteriorly ; antennae about 0·75 times body length in *males*, shorter in *females* ; disc of head punctured, punctures smaller than facets of eyes, separated by one to three diameters, each with a short seta equal in length to one and a half diameters ; surface between punctures irregular, with a tendency to groove-like impressions but otherwise shining.

Pronotum slightly broader than head, about as broad as long at its broadest, narrowed basally ; anterior angles acute and produced, posterior angles obtuse ; puncturation and setation on disc similar to that of disc of head ; surface micro-reticulate between lateral line and lateral margin ; the fovea included in lateral line shallow but includes a deep puncture.

Elytra as wide as pronotum at widest, slightly more than twice as long as their combined width, carinate laterally, disc concave between carina and suture ; almost parallel-sided until just before apices ; apices evenly rounded to apico-sutural angle ; cells weakly developed ; striae represented by rows of setae whose subtending punctures are very shallow.

RHODESIA, CONGO, ANGOLA, WEST AFRICA.

HOLOTYPE and 2 paratypes " N.W. Rhodesia Shigariatombwes, 8–vii–1913 H. C. Dollman " (British Museum (Natural History)) ; paratypes as follows : 3 " N.W. Rhodesia Mwengwa 27° 40′ E 30° S 26–vi–1913 H. C. Dollman " ; 1 " Sierra Leone " (British Museum (Natural History)) ; 1 " Angola 4194.5—Alto Chicapa, gal. forest. riv. Ngungo, dans. tronc 27–vi–54. Ed. Luna de Carvalho " ; 2 " Angola 4116.20—Alto Cuilo, Poste de Cacolo, rives de la Cavuemba, detr. sol, 26–v–54. A. de Barros Machado " ; 3 " Angola 411.6.17—Dundo, iii–48, piège lumineux. A. de Barros Machado " ; 1 " Angola 4118.9–Gal. forest. riv. Lunguena, affl. Luangue, Poste Xa-Cassau, 7–vi–54. A. de Barros Machado " ; 11 " Angola 10656.42–Marco de Canavezes (Cubal da Ganda), district de Benguela, piège lum ; iii–56. Ed. Luna de Carvalho " ; 3 " Angola 3158.24—Dundo, xii–53, piège lum. Ed. Luna de Carvalho " ; 13 " Angola 4895.3—Cazombo, Alto Zambeze, sous écorces arbres morts, 19–i–55. A. de Barros Machado " ; 1 " Angola 4323.23—Alto Chicapa, gal. forest. riv. Tchirimbo, detr. sol, 9–vii–54. A. de Barros Machado " ; 2 " Angola 4117.15—Alto Cuilo, Poste de Cacolo, gal. forest. ruisseau Tcha-Muchito, 2–vi–54. A. de Barros Machado " ; 1 " Angola 4742.14—Rives du Lac Calundo, sous écorces arbres morts, 19–i–55. A. de Barros Machado " ; 3 " Angola 4737.9 as 4742.14 ; 4 " Angola 3176.11—Dundo, ix–53, piège lum. Ed. Luna de Carvalho " ; 2 " Angola 4359.3—Alto Chicapa, 7–viii–54. Ed. Luna de Carvalho " ; 1 " Angola 4370.36—Alto Chicapa, gal. for. riv. Tchimboma, detr. sol, 17–i–55. A. de Barros Machado " ; 1 " Angola 4214.42—Alto Chicapa, gal. forest. riv. Ngungo, detr. sol, 27.vi.54. A. de Barros Machado " ; 1 " Angola 3115.21—Dundo, viii–53, piège Lum. Ed. Luna de Carvalho " (Museu do Dundo) ; 2 " Yangambi 1951 C. Donis 300, 302 " ; 3 " Luki 1951 P. Henrard 97 " ; 11 " Eala vii–viii–1935 J. Ghesquière " ; 24 " Eala iii–1935 J. Ghesquière " ; 3 " Eala x–1936 J. Ghesquière " ; 2 " Kindu L. Burgeon " ; 1 " Stanleyville 19–viii–1928 A. Collart " ; 1 " Kamajembi (Luebo) 21–ix–1921 Dr H. Schouteden " ; 1 " Malych 1942 Rev. P. Van Eyen " ; 1 " Katang : Kanzenge 12544 N. Leleup 12–ii–1949 " ; 1 " Tanganyika : Moba, 780 m (à la lumière) xi–1953

H. Bomans " (Mus. R. Congo Belge) ; 23 " IFAN 1953 Bafrechie (Mauritanie) 5–ix to 10–x A. Villiers " ; 13 " IFAN 1946 Mr Nimba N.E. 500–700 m. A. Villiers " ; 2 " Irabellaben Mrs Baguezans 1200–1300 m 28–31–viii IFAN 1947 L. Chopard, A. Villiers " (Muséum National d'Histoire Naturelle, Paris).

The *subtruncatus* Species Group

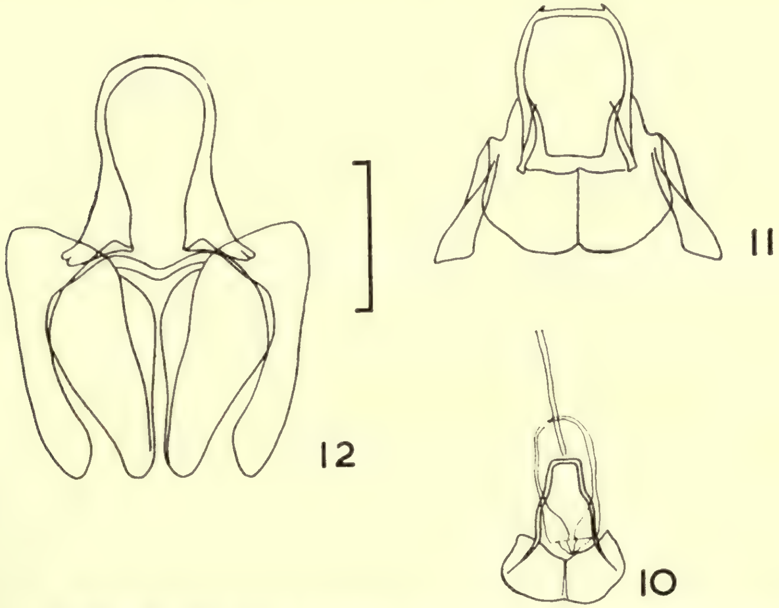
There are three species involved in this group, *P. subtruncatus* sp. n., *P. ealaensis* sp. n. and *P. africanus* sp. n. It has not been possible to separate these species on invariable external characters but there are no difficulties in seeing the differences between the male genitalia. Externally, the three species resemble *P. tastus* sp. n. but differ from it in that the body is yellowish brown in colour and in the tendency to longitudinal impressions on the surface of the head between the punctures.

5. *Placonotus subtruncatus* sp. n.

(Text-figs. 9, 11)

2·0–2·5 mm.; body yellowish to reddish brown in colour.

Head transverse ; eyes a quarter to a half times their diameter in advance of base of head, hemispherical in shape ; frontoclypeal sutural region with anterior shallow transverse impression consisting of a ridge and a deeper groove ; epistome emarginate anteriorly ; antennae about 0·75 times body length in *males*, fifth to eleventh segments about twice as long as broad, in



FIGS. 10–12. Male claspers of (10) *Placonotus ealaensis*, (11) *P. subtruncatus* and (12) *P. africanus*.

Scale line = 0·25 mm.

females antennae about 0·6 times body length, fifth and subsequent segments about 1·5–2·0 times as long as broad ; in both sexes, last three segments slightly dilated, more distinctly so in *female* ; disc of head punctured, the punctures slightly smaller than facets of eyes, separated by once to three times their diameter, each with a fine seta equal to 1·5 times this diameter in length ; surface between punctures polygonally reticulate but generally shining.

Pronotum slightly broader than head (including the eyes), very slightly broader than long at its broadest, narrowed basally ; anterior angles acute and produced, posterior angles obtuse ; disc ornamented similarly to disc of head ; fovea included in lateral line encroaches upon disc, moderately deep and often includes a deep puncture and blackish mark.

Elytra slightly broader than pronotum, broadest just anterior to mid-point, about 2·25 times as long as their combined width, abruptly deflected laterally but not carinate at fold ; each elytron separately and abruptly rounded to apico-sutural angle ; cells weakly developed, strial punctures shallow.

Ventral claspers of *male genitalia* straight posteriorly with three irregular dorsal rows of small tubercles posteriorly, in shape resembling a coal hammer ; dorsal claspers not completely divided in mid-line, less strongly chitinized medially than laterally, together of shape appropriate to a normal tenth tergite, ventral surface with four irregular rows of tubercles posteriorly ; both dorsal and ventral claspers in length equal to fifth externally visible abdominal sternite.

CONGO, WEST AFRICA.

HOLOTYPE male and 8 paratypes : " Nioka xii–53. P. Deville Pap. 49 " ; other paratypes as follows : 4 as holotype but dated 26–xii–53 and Pap 47, 1 with Pap. 46, 1 dated 28–xii–53 and Pap. 68 ; 1 " Katanga. Katompe 1/15–vi–1930 Dr. P. Gerard " (Mus. R. Congo Belge) : 2 " IFAN—1946 Tonkoui C.I. 900–1200 m. A. Villiers Forêt Prim. 20/30–ix " (Muséum National d'Histoire Naturelle, Paris).

6. ***Placonotus ealaensis*** **sp. n.**

(Text-fig. 10)

This species appears to be identical with *P. subtruncatus* sp. n. except in the structure of the male genitalia.

Dorsal claspers similar to those of *P. subtruncatus* but less evenly rounded externally ; ventral claspers hardly developed, being a thin rod on each side apparently fused posteriorly with the external angles of the dorsal claspers.

CONGO.

HOLOTYPE and 1 paratype (males) : " Eala viii–1935 J. Ghesquière " (Mus. R. Congo Belge).

7. ***Placonotus africanus*** **sp. n.**

As *P. subtruncatus* sp. n. except that the surface between the punctures is very weakly, if at all, polygonally reticulate and also differs in the structure of the male claspers :

Dorsal claspers completely divided medially except, apparently, for a thin transverse strut anteriorly, narrowed posteriorly where no wider than ventral claspers ; tubercles on dorsal claspers arranged in two groups, one irregular row running forwards along the lateral margin from posterior region until just before anterior margin ; other tubercles about twenty in number situated in a group antero-medially ; ventral claspers spatulate posteriorly, situated latero-ventrally, bearing about twenty-five long spines internally.

CONGO, ANGOLA.

HOLOTYPE male " Katanga : Kanzenze (a même l'argile sous bois pourri) 12544 N. Leleup 12–ii–49 " ; paratypes as follows : 1 " Katanga : Kansenze 22–xi–1948 12625 N. Leleup " ; 1 " Recolté dans l'humus. Distr. Elisabethville Gal. for. de la Kisanga 26–ix–51 N. Leleup " ; 4 "Elisabethville 6–x–1912 Miss. Agric." ; 1 " S/Bois divers Kasai : Kakenge Seierie Exforka i–1945. J. Vrydagh " ; 10 " Eala iii–1935 J. Ghesquière 376 " (Mus. R. Congo Belge) ; 18 " N.W. Rhodesia Shigaria-tombwes 8–vii–1913 H. C. Dollman " ; 1 " Angola 3176.11—Dundo, ix–53, piège lum. Ed. Luna de Carvalho " ; 2 " Angola 4117.15—Alto Cuilo, Poste de Cacalo, gal. forest ruisseau Tcha-Muchito, 2–vi–54. A. de Barros Machado " ; 1 " Angola 4119.3—Alto Cuilo (Cacalo), vi–54. A. de Barros Machado et Ed. Luna de Carvalho "; 1 " Angola 4373.9—Rives du Lac Calundo, sous écorces arbres morts, 19–i–55. A. de Barros Machado " ; 1 " Angola 4895.3—Cazombo, Alto Zambeze, sous écorces arbres morts 12–ii–55, Ed. Luna de Carvalho " ; 1 " 18 m. S.W. of Elizabethville 31–x–1927 Dr. H. S. Evans " (British Museum (Natural History)).

8. *Placonotus donacioides* (Wollaston) comb. n.

Laemophloeus donacioides Wollaston, 1854.
Laemophloeus granulatus Wollaston, 1854, **syn. n.**

Head very slightly transverse in *males*, as broad as long in *females* ; epistome shallowly emarginate anteriorly ; lateral line represented by raised ridge and an internal groove which includes a weakly impressed line ; surface punctured, punctures slightly larger than the facets of eyes, separated by once to twice their diameter ; surface between punctures polygonally reticulate.

Pronotum about as broad as long, narrowed both anteriorly and posteriorly ; anterior angles acute and produced, posterior angles obtuse ; lateral line and surface ornamentation as that of head.

Elytra with three cells developed, secondary intervals about half the width of cells ; strial punctures almost invisible.

MADEIRA, CANARIES.

There are 2 specimens without data labelled as types by G. Arrow in the Wollaston collection (British Museum). I select the male as lectotype of the species.

There are also two syntypes without data of *Laemophloeus granulatus* in the same collection. I select a male as lectotype. This species is quite clearly just a small form of *P. donacioides*.

9. *Placonotus politissimus* (Wollaston) comb. n.

Laemophloeus politissimus Wollaston, 1867.
Laemophloeus (*Silvanophloeus*) *mirus* Grouvelle, 1905, **syn. n.**

This species, when described by Grouvelle, was considered to be very similar to *Laemophloeus nitens* Leconte (this American species properly belongs to *Placonotus* and is now placed in that genus **comb. n.**). The two species were distinguished by the presence of femoral lines on the first visible sternite of the abdomen of *P. politissimus*. In addition it has been found that no other species of the genus from

Africa possesses femoral lines and thus this feature serves as an adequate distinguishing character.

1·5–2·0 mm.; body yellow to reddish brown in colour.

Head transverse ; eyes large and situated close to base ; frontoclypeal suture with shallow groove and without raised ridge anteriorly ; epistome emarginate anteriorly ; antennae about three-quarters length of body in *males*, somewhat shorter in *females*, distal three segments very slightly dilated in *males*, a little more so in *females* ; disc of head very evenly punctured, punctures separated by about two to four diameters, each puncture with a seta about 1·5 diameters in length ; intervals between punctures smooth and shining.

Pronotum transverse, about 1·25 times as wide as long, slightly broader than head ; broadest across anterior third ; anterior angles obtuse and rounded, posterior angles rectangular to slightly obtuse ; puncturation and setation as on head ; fovea of the lateral line apparently formed by fusion of three large shallow punctures.

Elytra broader across shoulders than pronotum at its widest, broadening slightly before mid-point and then narrowing towards apices, each evenly rounded to apico-sutural angle ; at their extreme length, between suture and external angle, elytra about twice as long as their combined width ; only the third cell is developed basally together with part of the first near mid-point and close to suture ; each elytron with inflected lateral region but not carinate ; striae with punctures considerably larger than those of head and pronotum.

The species exhibits marked heterogony in the adult structure in addition to some variation in size and puncturation.

Atlantic islands off AFRICA, CONGO, IVORY COAST, MADAGASCAR, SEYCHELLES.

There are eleven specimens in the Wollaston Cape Verde collection in the British Museum and two further specimens with a β written on the card standing in the position indicated by the species name. One of the eleven has a British Museum type label and a second label with " politissimus, Woll " in Wollaston's handwriting. In his original description Wollaston writes that the species was taken " in profusion " ; it would seem likely that these eleven specimens are all, or at least some, of the syntypes. I now select the labelled specimen, a male, to be lectotype. Of the remaining specimens, ten are the same species ; the specimens labelled β on the card are *Cryptolestes capensis* (Waltl). Wollaston, in discussing *Laemophloeus clavicollis* Woll. immediately after describing *L. politissimus*, refers to a " var. β *affinis* " and since *L. clavicollis* is *C. capensis* (see p. 235), I presume that these two specimens are misplaced in the collection and are not to be considered as syntypes of *L. politissimus*.

Grouvelle, in his original description of *Laemophloeus mirus* gave the following type localities : " Fort-Dauphin (coll. Alluaud) ; localité incertain (coll. A. Grouvelle) ; St-Thomé (coll. A. Grouvelle) ". In the Grouvelle collection in Paris, there are the following specimens of the species ; one " Madagascar [mss]/Type [black printed on white]/Laemophloeus mirus Grouv. ty [in Grouvelle's mss]/ Type [black printed on red] " ; one " Madagascar (Sud) Forêt Nord Ft. Dauphin Alluaud 1900 [printed] 17 [mss] ". In addition there are six specimens from Amani and one from the Cape of Good Hope which are obviously not syntypes. I have not located a specimen from St. Thomé in the Grouvelle collection either named as this species or unnamed but referable to it. I consider that the two specimens of the species whose detailed data are given above are syntypes and I now select the specimen which bears Gruovelle's mss label as lectotype. The other specimen is the same species. It is quite clearly the same species as *P. politissimus*.

The author has seen specimens of the species from the following places : Yangambi, 1951 (C. Donis), Lubilonga, ii.52 (M de Backer), Luki, vii.42 (R. Mayné), Luki, 1951 (P. Henrard), Elizabethville, ii.1940 (H. J. Bredo), Kunungu, 9.iv.1921 (Dr. H. Schouteden), Eala, ix.1938 (J. Ghesquière). Elizabethville—à la lumière, xi.50/vi.51 (Ch. Seydel), Mobeka, 16.iii.1911 (L. Burgeon) all within the Congo; 1 " Madagascar Namoroka xi.52 R. P(aulian) " ; 1 " Seychelle Islands Percy Sladen Trust Expedition/Mahe 1908–9 " ; 1 " Madagascar (Sud) Forêts Nord Ft. Dauphin Alluaud 1900 (17) " ; 1 " Haut Côte d'Ivoire, Danaue (Fort Hittos) A. Chevalier 1910, Avril " ; 1 " Madagascar Perrier ".

10. ***Placonotus bolivari*** (Grouvelle) **comb. n.**

Laemophloeus bolivari Grouvelle, 1905.

1·75–2·25 mm. ; body shining, yellowish red in colour, elytra much more yellow and almost transparent.

Head very transverse, about twice as broad as long ; eyes situated in advance of base ; head turning abruptly medially just anterior to antennae and anteriorly again at lateral end of frontoclypeal suture ; suture evenly rounded ; epistome truncate ; antennae as long as or slightly longer than body in *males*, about 0·75 times length of body in *females* ; scape robust and about equal in length to second and third segments combined in *males*, somewhat shorter in *females* ; distal segment slightly curved in *male*, straight in the *female*, in *female* last three segments slightly enlarged forming a loose club ; disc of head regularly punctured with irregularly shaped small punctures, punctures separated by a distance equal to two eye facets, each with a very short seta ; intervals between punctures rather shining and with very fine micro-punctures.

Pronotum very slightly broader than head at its broadest, 1·2 times as broad as long, broadest at about anterior quarter ; anterior angles ventral in position since anterior half of region between lateral line and lateral margin inflected ventrally ; angles obtuse and slightly produced ventrally, posterior angles rectangular or very slightly produced ; lateral line consisting of a groove, expanding from about the mid-point to a maximum at included deep puncture, narrowing towards basal fifth ; secondary raised line present basally between primary line and lateral margin ; disc with puncturation and setation as on the disc of head.

Elytra about twice as long as their combined maximum width which is at about their mid-point, there broader than pronotum, narrowing slightly until external apical angles, then turning more or less abruptly to sutural angle ; thus each elytron subtruncate ; cells not developed ; striae distinct ; elytra apparently glabrous except for a few larger setae apically ; abdomen only slightly exposed dorsally.

EAST and WEST AFRICA, CONGO.

HOLOTYPE " Biafra Cabo S. Juan viii–1901 Escalera/Type/15/L. Bolivari Grouv. ty." (Grouvelle coll). There are eight other specimens standing next to the type of this species all collected in S. Thomé, their data labels being written in differently coloured inks suggesting that they were acquired by Grouvelle at different times. The specimen collected by Escalera is the only one to bear the word type in Grouvelle's handwriting although three of the others have a printed label with the word type in addition to the locality label. I do not accept the S. Thomé specimens as syntypes and consider that the Escalera specimen is the holotype. Other specimens seen include 2 " Luki 1950 R2306 Com. et Bois Coll. R. Mayné " ; 4 " Yangambi,

1951 C. Donis z.304, 321, 323, and 326 Coll. R. Mayné Com. et Bois Congo R. 2326" ; 1 " Haut-Uele : Moto x–xi–1923 L. Burgeon " ; 1 " Mayumbe. Pulu-Banzi 17–ii–1924 A. Collart " ; 1 " Ubangi : Gemena 3–i–1936 C. Leontovitch " ; 2 " Yangambi 3–vii–1952 Dr. Schedl s.295 " (Mus. R. Congo Belge) ; 2 " St. Thomé " ; 1 " Ed. Luga Kondie Congo Belge " (Muséum National d'Histoire Naturelle, Paris).

11. ***Placonotus decoratus*** (Grouvelle) **comb. n.**

Laemophloeus decoratus Grouvelle, 1908.

This and the next species are the most distinct of African Laemophloeinae and certainly the most distinct *Placonotus*. *P. exornatus* (see below) differs in having the head, pronotum and the greater part of the elytra brown and not black as *P. decoratus*.

Since Grouvelle's description is quite adequate, the species will not be fully redescribed.

1·75–2·3 mm.; body shining ; mouthparts, basal segments of antennae, tibiae and tarsi dark brown ; femora, head, pronotum and the greater portion of each elytron black ; elytra otherwise yellow in a region at anterior third from about second or third strial interval to lateral margin. Elytra truncate, external apical angle being somewhat more distinct than usual ; last segment of abdomen almost entirely exposed dorsally ; in *male* paired accessory structures of genitalia often exposed.

The lectotype, which I now select, is in the Grouvelle collection in Paris and bears the following data : " Af. or All Amani/Eichelbaum/Type/*Laemophloeus decoratus* sp. nv. Grouv." The other syntype in the same collection bears identical data except that it does not bear the name of the species in Grouvelle's handwriting.

SOUTH AFRICA, CONGO, KENYA.

The author has seen specimens as follows : 2 " E. Cape Prov., Katberg 4000 ft. xii–1932 R. E. Turner " ; 1 " E. Cape Prov., Katberg 4000 ft. 13–15.iii–1933 R. E. Turner " (British Museum (Natural History)) ; 23 " Ruanda : Kayove 2000 m. terr. Kisenyi P. Basilewsky 14–ii–1953 " ; 1 " Manyema 1918 Sibatwa Kilengwe Dr. Gerard " ; 1 " Forêt de bambous et *Podocarpus* Kenya : Elgon, Vers. Est. 2500 m. (dans humus) N. Leleup 4–xii–1953 " ; 2 " Nioka xii – 1953 F. Deville Pap. 49/Com. et Bois Congo R. 2507 " (Mus. R. Congo Belge) ; 1 " O A Nandi Reservat leg. Alinder " (Munich).

12. ***Placonotus exornatus*** (Grouvelle) **comb. n.**

Laemophloeus (*Silvanophloeus*) *exornatus* Grouvelle, 1908.

It has not been possible to find any external difference between this and the previous species except in their colour ; it is therefore possible to confuse immature *P. decoratus* with *P. exornatus*. This difference in colour may indicate that the two species are not really distinct since *P. exornatus* is only known to the writer by two specimens. It may be possible to show that the two species are in fact synonymous if *P. decoratus* is found together with *P. exornatus* in South Africa and the specimens of *P. exornatus* are kept alive and observed to see whether they change colour with time. A similar colour difference between two species of otherwise identical *Cryptolestes* was found to reflect a specific difference (Lefkovitch, 1959*a*).

SOUTH AFRICA.

Grouvelle's original description was based upon a single male bearing the following data: "C. B. Ep. Donkis/Port Alfred/*L. exornatus* ty. Grouv." The author has seen a second specimen with the following data: " Port St. John Pondoland Nov. 1923/S. Africa R. E. Turner " (British Museum (Natural History)).

13. ***Placonotus mossus* sp. n.**

This species most resembles *P. donacioides* (Woll.) in that the nature of the microsculpture on the head and pronotum and the consequent dull appearance distinguish these two species from other *Placonotus*. These two species can be distinguished easily in that *P. donacioides* is relatively longer in its build and possesses punctures on its head in addition to the reticulation.

1·8 mm.; head and pronotum reddish brown, rather dull, elytra yellow and transparent.

Head transverse ; eyes situated about half a diameter in advance of base ; epistome shallowly emarginate ; frontoclypeal suture with a groove the anterior margin of which is raised slightly, evenly rounded posteriorly ; antennae in *male* with segments longer than broad, becoming progressively longer after third ; scape the most robust segment ; antennae in total length just reaching apices of elytra ; disc of head impunctate but strongly reticulate into polygonal areas, three of these areas being slightly greater in area than an eye facet ; without setae on disc.

Pronotum distinctly transverse, about 1·25 times as broad as long ; broadest at about mid-point ; distinctly broader than head ; distance between anterior angles only just perceptibly greater than that between posterior angles ; anterior angles acute and projecting, lateral margin just posterior to them evenly sinuate, not abruptly so as in most *Placonotus* ; posterior angles obtuse ; lateral line expanded somewhat just behind mid-point to accommodate the deep puncture or fovea ; surface of disc otherwise impunctate but reticulate as on head ; glabrous.

Elytra broadest at anterior third, there as broad as pronotum ; narrowing from this region to apices, each elytron separately rounded to apico-sutural angle ; elytra just twice as long as their combined width ; three cells present basally, outer margin of third continues further posteriorly than others ; striae more or less visible, apparently without setae. Legs somewhat shorter than is usual for the genus.

Female unknown.

CONGO.

HOLOTYPE male " Yangambi 1952 C. Donis z.2978 Com. et Bois Congo R.2440 " (Mus. R. Congo Belge).

III. ***XYLOLESTES* gen. n.**

Type species : *Laemophloeus unicolor* Grouvelle.

This genus is most closely related to *Xylophloeus* gen. n. which is described below. It resembles some species of that genus more closely than others, especially *Xylophloeus patens* (Grouvelle). The key to genera and the table on p. 190 outline the most important differences.

1·5–2·5 mm.; body moderately flattened.

Head distinctly transverse ; eyes situated about half their diameter in advance of base, occupying slightly more than one-third of lateral margin ; antennae inserted at about front corners of head and equal to half body length ; with last three segments more transverse and enlarged to form a distinct club ; epistome apparently straight but in fact with three shallow emarginations ; lateral line represented by a groove on each side, joined anteriorly by a transverse groove situated just behind epistome ; frontoclypeal suture obsolete ; labrum parallel-sided and truncate to distinctly emarginate anteriorly.

Pronotum transverse, with rounded anterior and obtuse posterior angles ; lateral line represented by a distinct groove ; basally a slight ridge and a shallow groove running laterally from lateral line to hind angle ; lateral lines joined anteriorly but not posteriorly by a groove.

Scutellum triangular with rounded angles ; *elytra* normally covering whole abdomen ; the three cells clearly defined, posterior border of first and borders of third much more clearly defined than others which may be obsolescent ; each elytron distinctly carinate laterally, the carina lying close to outer margin of third cell after basal third.

Genae normal ; *gular* sutures distinct ; anterior *coxal cavities* narrowly open posteriorly, with distinct lateral extension ; intercoxal process of the prosternum slightly concave posteriorly ; *mesepimeron* only just reaching mesocoxal cavities ; posterior margin of *mesosternum* slightly concave ; *metasternum* about equal in length to first and second visible abdominal sternites combined (Text-fig. 13) ; median metasternal line not reaching the anterior margin of sclerite ; first visible abdominal sternite about 1·5 times as long as second, second to fifth about equal to each other ; legs subequal ; trochantero-femoral junctions of normal type ; tarsal formula 5–5–5 (in both sexes).

Xylolestes unicolor (Grouvelle) **comb. n.**

(Text-fig. 14)

Laemophloeus unicolor Grouvelle, 1908.

This species was described by Grouvelle only in his key, to which the above reference relates, as " *unicolor* Grouv. Afrique or. all." Fortunately, it can be recognized as a distinct and not uncommon species in Africa. The species is redescribed below.

1·5–2·75 mm.; body reddish brown in colour, elytra more yellow than head and pronotum, tarsi and antennal club yellow.

Head transverse, trapezoidal in shape ; antennae just reaching basal quarter of elytra, fourth to eighth segments as wide as long, segments one to three more elongate, at most twice as long as wide ; last three segments about 1·5 times as broad as eighth and except for last segment, 1·5 times as long as eighth ; last segment about twice as long as broad and shaped rather like an egg ; disc of head irregularly punctured with irregularly shaped punctures, these smallest and most nearly circular near mid-line, largest half-way between mid-line and lateral line ; the largest punctures somewhat larger in diameter than facets of eyes ; surface of head shining between punctures ; with sparse, very fine setae which are often not easily visible.

Pronotum twice as wide as long, broadest in front of middle where thorax 1·1–1·25 times as wide as head across and including eyes ; anterior angles rounded, posterior obtuse ; punctuation on disc finer than on head ; setation as on head.

Elytra across shoulders as broad or broader than pronotum, slightly more than twice as long as their combined width, roughly oval in shape ; broadest at about anterior third, there about 1·25 times as broad as pronotum ; thinner darker areas of elytra are arranged in rows and probably represent striae ; apparently glabrous.

There are two syntypes of this species in the Grouvelle collection, one with data " Zanzibar Raffray/Laemophloeus unicolor Grouv ty " and the other " Af.or. All. Amani/Eichelbaum/Type [mss] " and a Paris museum type label. I now select the first of these specimens to be lectotype.

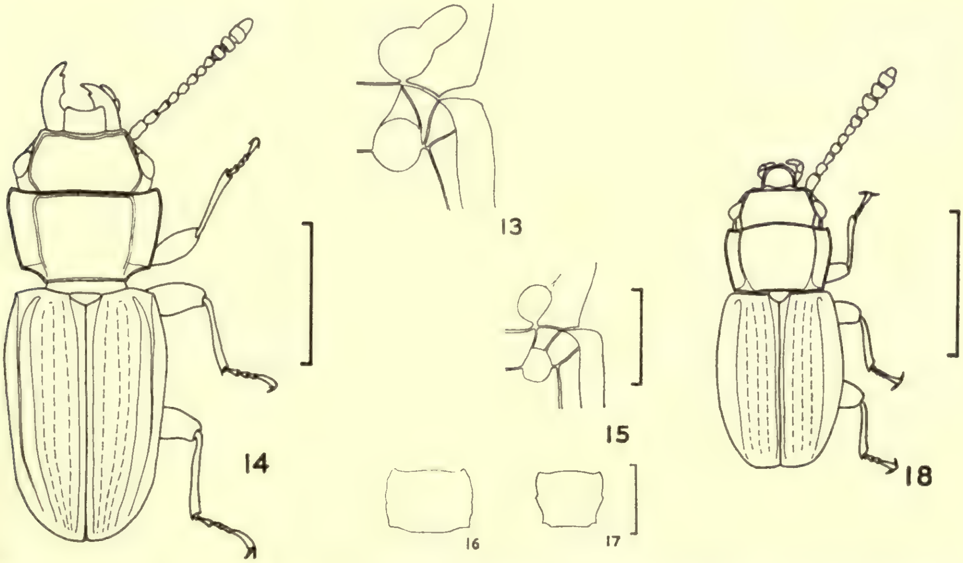
East and West Africa, Congo, Angola.

I have examined the following specimens of the species : 1 " Nioka 27–ii–54 F. Deville Pap. 57 R.2507 " ; 1 " Yangambi, 1951 z.261 R. 2333 " ; 7 " Coquilhatville 27–viii–1930 J. Vrydagh " ; 2 " Eala vii–1935 J. Ghesquière " ; 2 " Poto-pot près Dima 4–ix–1930 G. F. de Witte " ; 2 " Ituri : La Moto : Madyu L. Burgeon " ; 1 " Equateur : Flandria xi–1929 R. P. Hulstaert " ; 1 " Haut Uele, Walsa, xi–1919 L. Burgeon " ; 1 " Recolté dans l'humus/Kivu : T. Fizi, Bas Itombwe 1000 m. (Gal. for. Mukera) N. Leleup ii–52 " ; 1 " Kwamouth vi–1921 Dr. H. Schouteden " ; 1 " Isangi 1929 J. Walkiers " ; 1 " Lulua ; Kapanga vii–1932 G. F. Overlaet " Miss. H. de Saeger : 1 (2062) ; 1 (2115) ; 1 (3563) ; 1 (3744) (see Appendix) (Mus. R. Congo Belge), 1 " Angola 1253.11.2. Dundo, galerie forestière Luachimo, sous écorces arbres tombes, xii–48 A. de Barros Machado " (British Museum (Natural History)) ; 22 " IFAN-1946 Tonkui C.I. 900–1200 m. A. Villiers " ; 1 " Amani " ; 1 " Côte d'Ivoire Bimbroko " ; 1 " S. Thomé (Muséum National d'Histoire Naturelle, Paris).

IV. *XYLOPHLOEUS* gen. n.

Type species : *Laemophloeus patens* Grouvelle.

This genus resembles the previous in several ways ; it can be distinguished by the characters given in the key to genera on p. 172 but especially by those given in the tabulated comparison with *Xylolestes* (p. 190).



Figs. 13–18. (13) Front and middle coxal cavities of *Xylolestes unicolor* ; (14) dorsal view of *X. unicolor* ; (15) front and middle coxal cavities of *Xylophloeus patens* ; (16) pronotum of *X. bimaculatus* and (17) of *X. unifasciatus* ; (18) dorsal view of *X. patens*. Scale lines : Figs. 13, 15 = 0·25 mm. ; Figs. 14, 16, 17, 18 = 1 mm.

2·5 mm.; body moderately flattened.

Head transverse and rectangular in its general appearance ; lateral lines distinct and forming part of dorsal margin of eye, joined anteriorly just behind epistome by an almost straight ridge ; epistome with three emarginations ; antennae inserted just behind front corners of head, their segments (except for scape and pedicel) slightly transverse, last three forming a loose club ; frontoclypeal suture obsolete although depressions corresponding with this and with median line can be seen if the incident light is at the correct angle ; eyes situated in advance of base of head ; labrum rounded anteriorly.

Pronotum transverse, somewhat cordiform ; anterior and posterior angles acute ; lateral line represented by a ridge raised above the general surface ; internal to lateral line often a row of small punctures situated very close to lateral line, somewhat more distinct behind mid-point ; externally to lateral line a shallow circular fovea situated at about mid-point, diameter of which about equal to distance separating line from margin.

Scutellum triangular, slightly transverse ; *elytra* with three cells developed although lateral margin of third obsolescent just after base ; no lateral carina present but lateral region evenly deflected ventrally from inner border of third cell.

Genae normal ; *gular* sutures distinct ; anterior *coxal cavities* slightly open posteriorly ; anterior coxae spherical and well separated ; intercoxal process of prosternum straight posteriorly ; *metepimeron* not contributing to mesocoxal cavity but *mesepisternum* and *mesepimeron* contribute equally, forming together about one-third of circumference of cavity (Text-fig. 15) ; *metasternum* equal in length to first two visible abdominal sternites ; first abdominal sternite twice as long as second, its intercoxal process straight anteriorly ; second sternite slightly longer than either third or fourth, the fifth about equal to or slightly longer than second.

Legs subequal ; trochantero-femoral junctions of normal type ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

Xylolestes **gen. n.**	*Xylophloeus* **gen. n.**
Lateral lines of head represented by groove, joined anteriorly by a transverse groove .	Lateral lines of head represented by ridges, joined anteriorly by a transverse ridge.
Epistome apparently straight but with three shallow emarginations .	Epistome with three distinct emarginations.
Antennae inserted at front corners of head .	Antennae inserted behind front corners of head.
Labrum parallel-sided, truncate to distinctly emarginate anteriorly .	Labrum rounded anteriorly.
Prothorax with rounded anterior and posterior angles .	Prothorax with acute anterior and posterior angles.
Lateral line of pronotum represented by a groove .	Lateral line of pronotum represented by a ridge.
Each elytron carinate laterally .	Elytra not carinate laterally.
Intercoxal process of prosternum concave posteriorly .	Intercoxal process of prosternum straight posteriorly.
Mesepimeron just reaching middle coxal cavities .	Mesepimeron and mesepisternum contribute equally to middle coxal cavities.

KEY TO SPECIES

1. Pronotum at widest as wide as elytra at shoulders 2
– Pronotum at widest narrower than elytra at shoulders 4
2. Pronotum hardly broader than long (1·1 times) ; disc of pronotum convex
2. ***mimosae*** sp. n. (p. 192)
– Pronotum transverse (1·3–1·5 times as broad as long) ; disc of pronotum flat . 3
3. Pronotum unicolorous yellow ; elytra coloured as pronotum 1. ***patens*** (Grouvelle) (p. 191)

– Pronotum darker in colour on disc between lateral lines than outside ; elytra with dark markings . . . . 7. ***dentatus*** sp. n. (p. 194)

4. Pronotum entirely black . . . . 3. ***chrysomeloides*** sp. n. (p. 192)

– Pronotum red or yellow, at least in part 5

5. Elytra black but for the humeral angles which are dark red in colour 4. ***elgonensis*** sp. n. (p. 193)

– Elytra entirely yellow or with a dark maculation on each 6

6. Hind angles of pronotum slightly acute ; disc of pronotum almost black ; distance between hind angles of pronotum equal to or slightly more than that between the front angles (Text-fig. 16) . . . . . . 6. ***bimaculatus*** sp. n. (p. 193)

– Hind angles of pronotum obtuse ; disc of pronotum hardly if at all darker than the lateral region ; pronotum narrower between the hind angles than between the front angles (Text-fig. 17) . . . . . . 5. ***unifasciatus*** sp. n. (p. 193)

1. ***Xylophloeus patens*** (Grouvelle) **comb. n.**

(Text-fig. 15)

Laemophloeus patens Grouvelle, 1908.

2·0–2·25 mm.; yellowish brown in colour, elytra almost transparent.

Head with front region at slightly lower level than rest (? frons) ; lateral line formed by ridge and groove ; secondary line present behind eye ; antennae reaching to basal third of elytra, third segment slightly elongate ; disc evenly punctured, punctures equal to or slightly smaller than facet of eye, separated by one to three diameters, with fine setae about equal to three diameters in length.

Pronotum 1·7 times as wide as long at maximum width, which varies from about mid-point to just behind anterior angles ; at maximum width prothorax very slightly broader than head ; lateral lines formed by slightly raised ridge, occasionally not joined by transverse line posteriorly ; anterior angles produced further anteriorly than greater part of anterior margin of pronotum, acute in shape but extreme apices rounded ; posterior angles sharp and acute-angled ; punctuation and setation on disc similar to that on disc of head.

Elytra of maximum width at about basal third, there 1·25 times as broad as pronotum ; slightly less than twice as long as their combined width ; punctured striae present but elytra apparently glabrous.

SOUTH and EAST AFRICA, CONGO.

There are 2 syntypes of the species in the Grouvelle collection ; I select as lectotype a male which bears the following data : " Af. or. All Amani/Eichelbaum/Type/3g/*Laemophloeus patens* n.s. ty. Grouv." The data of the paralectotype are " Af. or. All. Amani/Eichelbaum/Type [mss] " and a Paris museum type label.

I have also examined the specimens whose data are given below : 3 " Zululand : Eshowe. 6–31–v–1926 S. Africa R. E. Turner " ; 9 " Port St. John, Pondoland. Sept 1923 S. Africa R. E. Turner " ; 1 " Natal, near Durban (Virgin bush), 10–18.xii.1904 " ; 1 " Malvern, Natal G. A. K. Marshall—viii–1897 " (British Museum (Natural History)) ; 1 " Forêt de transition/Tanganyika Terr : Uluguru Mts., val. Ullulu-Ndogo, 1500 m. 8–v–1957/Mission Zoolog. I.R.S.A.C. en Afrique orientale (P. Basilewsky et N. Leleup) " ; 1 " Forêt de montagne/Tanganyika en Afrique orientale (P. Basilewsky et N. Leleup) " ; 2 " Tanganyika Terr : Mt. Oldeani, Versant Est, for. bamb. 2350–2500 m. 6/9–vi–57/P. Basilewsky et N. Leleup " ; 1 " For. montange/Kivu : Terr. Kabare, S.E. Kahuzi, 2080/2200 m. N. Leleup viii–1951 " ;

1 " Recolté dans l'humus/Kivu : Terr. Uvira, Mulenge 1880–2010 m. (Vest. forêt ombroph.) v–1951 N. Leleup " (Mus. R. Congo Belge).

2. *Xylophloeus mimosae* sp. n.

3·0–4·0 mm.; body rather shining.

Head 1·5 times as wide across eyes than long ; eyes situated one diameter in advance of base, their mid-points equidistant from base and antennal insertions ; lateral line formed by raised ridge ; secondary line present posterior to eye ; median line visible as a shadow when viewed with lateral illumination ; punctures on disc about equal to 1·25 times diameter of eye facet ; separated by 2–4 times diameter of puncture, each with seta about equal to two diameters in length ; surface of head between punctures with short impressed lines inclined at an angle to median line and parallel with each other on each side, about equal to two punctures in length ; surface of head between punctures and lines otherwise shining.

Pronotum 1·1–1·2 times as wide as long, slightly broader than head, narrowing basally ; front angles acute, hind angles acute and projecting ; lateral line formed by raised ridge ; lateral margin weakly toothed at posterior border of fovea ; puncturation, setation and surface of disc as on head.

Elytra broadest at about middle, there nearly twice as wide as pronotum, about 1·75 times as long as their combined width ; each elytron with internal margin of first cell visible apically, separated by striae from the basally visible internal margin of third cell ; each strial puncture with a short seta.

ETHIOPIA.

HOLOTYPE and 4 paratypes (1 partially dissected) : " Under bark of decaying Mimosa/Djem-Djem Forest nearly 9,000 ft. 1–x–1926 Dr. H. Scott " (British Museum (Natural History)).

3. *Xylophloeus chrysomeloides* sp. n.

2·5 mm.; trophi, epistomal region of the head, first two and base of third antennal segments reddish in colour ; remainder of head, pronotum and antennae black, antennae with yellow setae ; elytra yellow but for suture, interstices adjacent to fifth stria and lateral inflected margin brown in colour ; striae somewhat darker than interstices ; pygidium brown ; general surface rather dull.

Head 1·5 times as wide as long ; lateral line formed by raised ridge with adjacent row of closely applied punctures ; secondary line present posterior to eye ; punctures on disc about equal to eye facet in size, slightly smaller behind epistomal ridge, separated by one to three diameters ; surface of head strongly reticulate between punctures.

Pronotum 1·25 times as wide as head, broadest at about anterior third ; lateral line formed by a broad, raised ridge and a closely approximated row of punctures, just turning towards centre anteriorly before disappearing and therefore not meeting its fellow behind anterior margin of sclerite ; disc punctured as on head and with a similar reticulation ; surface between lateral line and lateral margin reticulate and with few punctures ; lateral margin without a tooth near the obsolescent fovea ; just before base of disc two very shallow foveae, their centres equidistant from lateral line and lateral margin.

Elytra broadest at mid-point, there about 1·75 times as broad as pronotum ; about 1·8 times as long as their combined width ; punctured striae somewhat depressed below general level of elytra, each puncture with a seta ; surface with longitudinal reticulations between striae, almost micro-rugose ; pygidium coarsely and closely punctured, with long setae.

CONGO.

HOLOTYPE female " Recolté dans l'humus/I.R.S.A.C. Kivu : Terr. Unira, Lubuka 2780 m. (for. bamb.) 4–xi–51 N. Leleup " (Mus. R. Congo Belge).

Male unkown.

4. *Xylophloeus elgonensis* sp. n.

This species resembles *X. mimosae* sp. n. but differs in the following particulars : head, antennae, apical and basal regions of pronotum, scutellum, humeral angles of elytra and legs red in colour ; middle region of pronotum, remainder of elytra and pygidium black ; impressed lines between the punctures on discs of head and pronotum more dense and slightly deeper ; elytra across shoulders 1·3 times as broad as pronotum at its broadest.

KENYA.

HOLOTYPE " Dans feuilles mortes de bambous I.R.S.A.C.—Mus. Congo Kenya : Elgon, Vers. Est. 300 m. 11–xii–1953 N. Leleup " (Mus. R. Congo Belge).

5. *Xylophloeus unifasciatus* sp. n.

(Text-fig. 17)

This species resembles *X. elgonensis* sp. n. very closely in its general shape and differs only in its coloration which is as follows : bases of elytra (except along the suture), apices of elytra and legs yellowish, body otherwise red.

EAST AFRICA, CONGO.

HOLOTYPE male " Africa or. Katona/Kilimanjaro x–1904 " (Természettudományi Muzeum, Budapest) ; paratypes : 1 " Kivu : Tshibinda xi–1932 L. Burgeon "; 1 " Recolté dans l'humus/Kivu : T. Kalehe, 2200 m. Contref. S.O. Kahuzi (forêt de bambous) viii–1951. N. Leleup " ; 1 " Kivu : Terr. Uvira, Lubuka 2180 m. (marecage) 3–ix–1951. N. Leleup " (Mus. R. Congo Belge).

6. *Xylophloeus bimaculatus* sp. n.

(Text-fig. 16)

3–4 mm.; disc of head and pronotum, middle of each elytron black in colour, remainder of body yellow ; shining and almost glabrous.

Head only slightly broader than long ; antennae with all segments elongate, pedicel shortest ; lateral line formed by raised ridge and internal punctured groove ; secondary line present behind eye ; disc punctured, punctures somewhat larger than an eye facet, but somewhat smaller peripherally ; surface of head otherwise smooth and shining except for a few minute punctures between the larger ones.

Pronotum at widest 1·5 times as broad as head, broadest at basal third where lateral margin sinuate ; anterior angles produced, acute but apically rounded ; posterior angles slightly acute ; lateral line formed by ridge and internal punctured groove ; a deep fovea present in sublateral region ; disc with punctures as on head ; punctures of explanate sublateral region much smaller and very much sparser than those of disc.

Elytra at widest 1·5 times as wide as pronotum, broadest at basal third just anterior to darker markings ; between humeral teeth elytra 1·4 times as wide as pronotum ; elytra about 1·5 times as long as their combined width ; not carinate laterally but laterally evenly curved ventrally except for extreme lateral region which is explanate ; third cell well developed basally, outer margin disappearing before the maculation ; elytra striate.

CONGO.

HOLOTYPE female " Ruanda : Yanina, terr. Klibuye, 2,300 m 12–ii–1953. P. Basilewsky " and 1 paratype, female " Recolté dans l'humus/I.R.S.A.C. Kivu : Terr. Uvira, Mulenga 1880–2010 m. (Vest. for. ombroph.) v–1951 N. Leleup " (Mus. R. Congo Belge).

7. *Xylophloeus dentatus* sp. n.

3·0–3·5 mm.; trophi, anterolateral regions of head, scape, pedicel, lateral regions of pronotum and elytra, basal region of elytra adjacent to scutellum and median apices of elytra (other than suture) yellow to red in colour, remainder of dorsal surface black ; antennae with yellow setae ; moderately shining.

Head about twice as wide as long, less trapezoidal in shape than usual for the genus ; lateral line formed by raised ridge ; a secondary line present behind eye ; disc of head punctured, the punctures of diameter about equal to nearly twice that of eye facet, except near and at median region where they are smaller ; separated by distance equal to about half their diameter to twice their diameter ; disc of the head polygonally reticulate anteriorly but laterally compressed elsewhere ; surface of disc otherwise shining.

Pronotum 1·7 times as wide as long, at widest about 1·3 times as wide as head, broadest at about anterior third and equally broad across lateral blunt teeth situated on lateral margin at the basal third ; anterior angles produced, acute in shape but rounded at the extreme apices ; posterior angles acute and slightly projecting ; lateral line formed by raised ridge and internal groove, not joined together transversely behind anterior margin ; sublateral fovea large in area, encroaching upon ridge of lateral line ; at region of fovea, lateral margin thickened, forming a blunt tooth ; lateral region explanate ; disc with punctures smaller and further distant than those of head, separated by a distance equal to twice to six times their diameter.

Elytra broadest at basal third, 1·7 times as broad as pronotum, slightly broader across shoulders than pronotum (1·1 times) ; almost twice as long as their combined width ; evenly rounded to apico-sutural angle ; in longitudinal section elytra sinuate, being concave basally becoming convex at apical third ; carinate laterally, lateral margin narrowly explanate.

KENYA, EAST AFRICA.

HOLOTYPE " Ravin boisé/Tanganyka Terr. : Mt. Meru, Oikokola, versant N.O. 2750 m. 25–vi–1957/Mission Zoolog. I.R.S.A.C. en Afrique orientale (P. Basilewsky et N. Leleup) " (Mus. R. Congo Belge) ; 1 paratype " Kidumnik (?) Ukunda [Kenya] ii–1947/Com. Inst. Ent. Coll. No. 10840 " (British Museum (Natural History)).

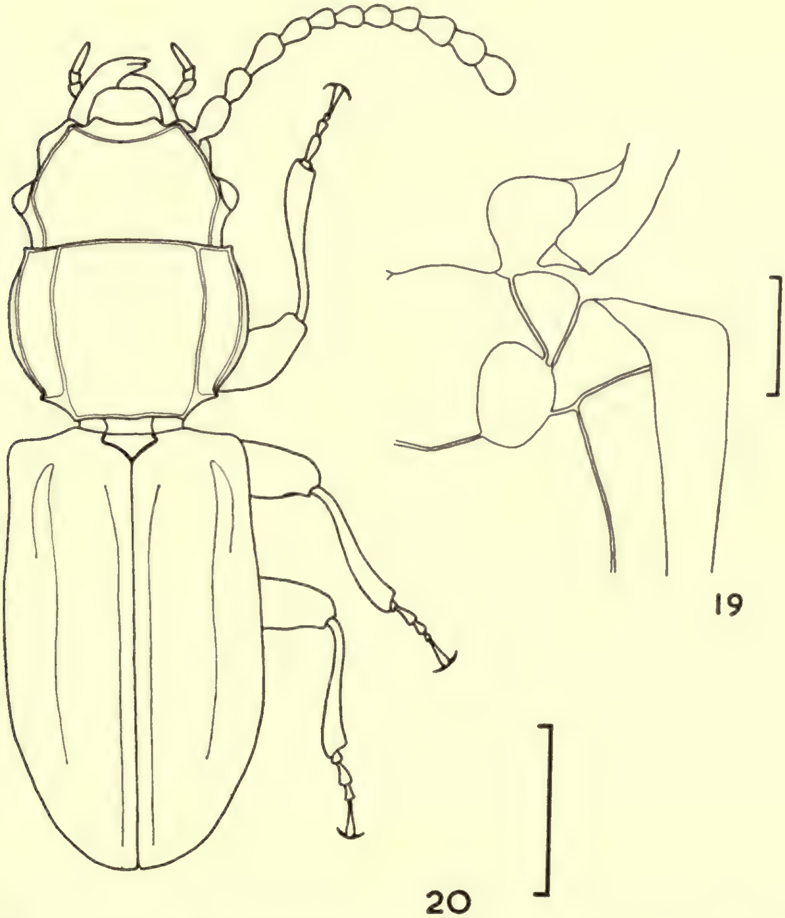
V. *BLUBOS* gen. n.

Type species : *Blubos matris* sp. n.

This genus appears to stand apart from other Laemophloeine genera known to the writer and as such it is difficult to find another genus with which it can be compared. It resembles, at least superficially, some of the species of *Xylophloeus* gen. n. but differs in many features, the most conspicuous being that the suture between the pronotum and pro-episternum is dorsal in position and not lateral as in that genus.

Head parallel at base, turning outwards just behind eyes ; across eyes head as broad as pronotum ; antennae about equal in length to head and pronotum, third segment somewhat longer than second, distal three segments slightly enlarged ; antennae inserted laterally, behind the apparent front angles of head, insertions somewhat sunken ; lateral line on head behind eyes represented by very fine ridge, anterior to eyes this ridge more completely developed ; lateral lines joined anteriorly behind epistome by an evenly curved concave ridge ; that part of frons anterior to this ridge evenly emarginate anteriorly, the whole anterior region of head having three emarginations ; labrum very slightly emarginate anteriorly, otherwise evenly rounded.

Pronotum transverse, broadest in front of middle ; anterior angles acute, posterior angles acute and produced ; lateral lines represented by groove, its outer margin continuous with anterior and posterior discal margins ; secondary line present basally running medially from posterior angle and turning anteriorly for short distance just before primary line before disappearing ; at about mid-point of lateral region two large, deep punctures or foveae situated between lateral line and lateral margin of pronotum ; suture between pronotum and pro-episternum visible dorsally, pro-episternum providing outermost lateral region of prothorax.



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FIGS. 19–20. (19) Front and middle coxal cavities of *Blubos matris* ; (20) dorsal view of *B. matris*.

Scale lines : Fig. 19 = 0·25 mm. ; Fig. 20 = 1 mm.

Scutellum triangular, apex sharp ; *elytra* with distinct, punctate striae, third cell developed apically ; not carinate laterally ; somewhat narrowed apically, rounded to apico-sutural angle, leaving part of last abdominal segment exposed dorsally.

Genae normal, *gular* sutures distinct ; anterior *coxal cavities* broadly open behind, slightly transverse ; hind margin of intercoxal prosternal process concave posteriorly ; intercoxal process posteriorly deflected dorsally ; *metepisternum* not reaching mesocoxal cavity ; *mesepimeron* and *metasternum* meeting on a broad front (Text-fig. 19) ; *metasternum* as long as first and second abdominal sternites combined ; intercoxal process of first visible abdominal sternite slightly rounded anteriorly ; abdomen narrowing towards apex ; first visible abdominal sternite twice as long as second, second to fourth equal to each other, the fifth slightly longer than fourth ; legs of normal length for the subfamily ; trochantero-femoral junctions of normal type ; tarsal formula 5–5–4 in the *male* ; *female* unknown.

***Blubos matris* sp. n.**

(Text-fig. 20)

About 4 mm.; head, pronotum and antennae reddish yellow in colour, elytra more yellow, the punctures somewhat red ; each elytron with one dark brownish mark, both together giving the impression of the letter " M "; legs yellow with bases of tibiae and tarsi more red in colour ; apices of mandibles black.

Head with large punctures, separated by slightly less than one diameter, surface shining between them, each puncture with a short seta.

Pronotum with puncturation and setation on disc as that of disc of head ; region between lateral line and lateral margin with very few, much smaller punctures, each with a seta.

Elytra with first, third and fifth intervals with a few punctures present basally, these punctures further separated than those of striae ; apices of elytra with a few slightly longer setae ; *pygidium* finely punctured, with fine reticulation between punctures.

CONGO.

HOLOTYPE " Kivu : contr. S. Kahuzi, km. 27, 2200 m., 28–iii–1953 P. Basilewsky " (Mus. R. Congo Belge).

VI. ***MICROLAEMUS* gen. n.**

Type species : *Microlaemus turneri* sp. n.

This genus includes species which superficially resemble those of *Hypocoprus* Mots. ; amongst the Laemophloeinae, the genus could be confused with some *Cryptolestes* but can be distinguished from that genus by the possession of a distinctly visible frontoclypeal suture, the transverse anterior coxae with their cavities open posteriorly (Text-fig. 21), and with the fifth visible abdominal sternite about twice as long as the fourth whereas *Cryptolestes* has closed front coxal cavities, the coxae being globular, the frontoclypeal suture obsolete and the last visible abdominal sternite only as long as the fourth at the most.

1–2·5 mm. ; body moderately flattened.

Head somewhat triangular in shape ; eyes moderate in size, situated in advance of base ; antennae with scape and pedicel elongate, other segments transverse, distal three segments forming a loose club ; epistome shallowly emarginate or truncate anteriorly ; lateral line represented by raised ridge and closely approximated internal groove ; frontoclypeal suture and median line represented by slight depressions in general surface of head.

Pronotum slightly transverse or very occasionally very slightly longer than broad ; anterior and posterior angles obtuse to rounded in shape ; lateral line represented by raised ridge and a closely situated internal groove.

Scutellum triangular in shape ; *elytra* carinate laterally ; three cells developed, lateral margins of first and second indistinct ; secondary intervals narrow.

Genae moderately well developed lateroventrally to trophi, *gular* sutures obsolete ; anterior *coxae* transverse, with distinct lateral extensions, their cavities open posteriorly ; intercoxal process of prosternum separating coxae to some extent, in the smallest species separation much less in proportion to general body structure than in more typical species of genus ; intercoxal process convexly rounded posteriorly ; *metepisternum* just contributing to mesocoxal cavity, *mesepimeron* and *mesepisternum* contributing about equally ; *metasternum* equal in length to first two visible abdominal sternites combined ; intercoxal process of first visible abdominal sternites narrow and rounded anteriorly ; first abdominal sternite 2·25–2·5 times as long as second, second to fourth equal to each other, fifth somewhat longer, legs subequal ; trochantero-femoral junctions of normal to elongate type ; middle femora less dilated than either front or back ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

KEY TO AFRICAN SPECIES

1. Body less than 1·5 mm. in length ; frontoclypeal suture obsolescent 4. ***slades*** sp. n. (p. 199)
– Body more than 1·5 mm. in length ; frontoclypeal suture distinct . . . 2
2. Body very dark brown to black in colour, palpi pale yellow in colour 3. ***palpalis*** (Waterhouse) (p. 198)
– Body brown in colour, palpi almost the same colour as the rest of the body . . 3
3. Head produced anterior to the insertions of the antennae and rather narrow across the epistome (Text-fig. 22) . . . . . . 2. ***ferrugineus*** sp. n. (p. 198)
– Head normally developed anterior to the antennal insertions and of normal width across the epistome (Text-fig. 23) . . . . . 1. ***turneri*** sp. n. (p. 197)

The following species, hitherto placed in *Laemophloeus*, belong to *Microlaemus* : *M. sylvestris* (Grouvelle), *M. interceptus* (Grouvelle), both from India, *M. picipennis* (Grouvelle) from Ceylon and *M. sulcifrons* (Grouvelle) from Réunion **combb.n.;** *Lathropus brightensis* Blackburn from Australia may belong to this genus although further study is necessary before this last opinion can be confirmed.

1. *Microlaemus turneri* sp. n.

(Text-figs. 23, 24)

1·75–2·0 mm. ; brown in colour ; pubescent.

Head 1·5 times as wide as long ; epistome rounded anteriorly ; frontoclypeal suture evenly concave ; distance between anterior margin of eye and apex of epistome equal to that between anterior margin of eye and base of head ; antennae just reaching base of pronotum ; mandibles expanded laterally so that their posterolateral border is parallel with anterior border of the produced genae ; disc of head evenly and shallowly punctured, punctures slightly larger in diameter than facet of eye, separated by distance equal to once to twice times their diameter, each with seta equal to two diameters in length ; surface between punctures polygonally reticulate.

Pronotum very slightly transverse, widest at anterior quarter, slightly broader than head (1·1 times), narrowed basally ; anterior and posterior angles slightly obtuse ; disc with punctures, setae and surface as on head.

Elytra twice as long as their combined width, broadest at their mid-point, there 1·1 times as broad as pronotum ; apices of the elytra separately rounded to the apico-sutural angle ; striate, setae as long as those of head and pronotum.

SOUTH AFRICA.

HOLOTYPE male " Natal : Kloof 1500 ft. Sept. 1926 R. E. Turner " and 8 paratypes with same data ; other paratypes : 6 " Zululand : Eshowe 1–22.v.1926 R. E. Turner " ; 1 " Port St. John, Pondoland June 1–11. 1923 R. E. Turner " ; 5 " Stn. No. 59 Deepwalls Forest. Knysna, 16–iii–1954, under bark of Yellow-wood, 1725 ft. Cape Province J. Balfour Browne " ; 1 " Stn. No. 59 Deepwalls Forest. Knysna, 17–iii–1954 small pool in glade, 1725 ft. Cape Province J. Balfour Browne " (British Museum (Natural History)).

2. ***Microlaemus ferrugineus* sp. n.**

(Text-fig. 22)

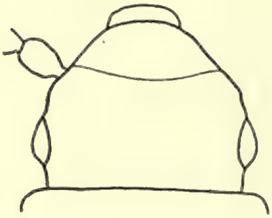
Resembles *M. turneri* sp. n. except as follows : head very much more triangular, epistomal region quite narrow ; distance between anterior margin of eye and epistome twice that of distance between anterior margin of eye and base of head ; frontoclypeal suture only slightly concave in shape.

HOLOTYPE " Mauritius J. E. M. Brown B.M. 1899–265 " (British Museum (Natural History)).

3. ***Microlaemus palpalis*** (Waterhouse) **comb. n.**

Laemophloeus palpalis Waterhouse, 1876.
Laemophloeus tenebrosus Grouvelle, 1899, **syn. n.**

1·8 mm.; body reddish black in colour, maxillary palpi and tarsi yellow ; setae on head and pronotum white to yellow in colour.



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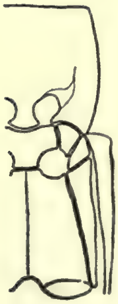

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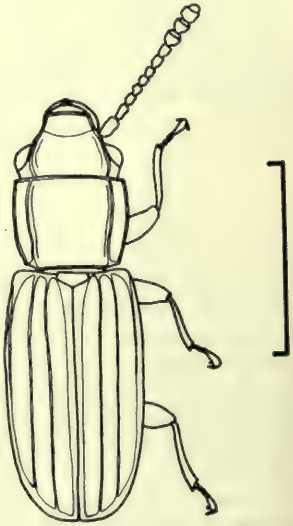

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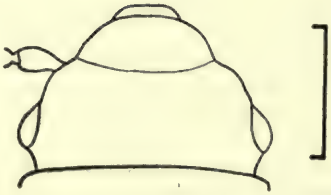

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FIGS. 21–24. (21) Front and middle coxal cavities of *Microlaemus slades* ; (22) head of *M. ferrugineus* and (23) of *M. turneri* ; (24) dorsal view of *M. turneri*. Scale lines : Figs. 21–23 = 0·25 mm. ; Fig. 24 = 1 mm.

Head coarsely punctured, punctures equal in diameter to two eye facets, separated by less than half one diameter ; punctures smaller on frons ; surface, including that of internal regions of punctures, reticulate.

Pronotum slightly longer than wide ; disc of pronotum punctured similarly to that of head, but punctures further separated ; surface reticulate ; lateral margin with eleven or twelve blunt tubercles ; sublateral region with row of large, closely approximated punctures situated close to lateral line, their medial margins forming part of lateral line ; external to these punctures a second row of deep and smaller punctures alternating with first row but absent at base and apex.

In its body proportions this species is identical with the generic type.

HOLOTYPE " Rodriguez G. Gulliver 76–15/*Laemophloeus palpalis* (*Type*) C. Waterh." (British Museum (Natural History)). The holotype of *L. tenebrosus* Grouvelle, which bears the data " I. Bourbon [Mauritius]/Type [mss]/*Laemophloeus tenebrosus* Grouv " and a Paris museum type label, was found to be the same species as *M. palpalis* (Waterhouse).

4. *Microlaemus slades* sp. n.

1·0 mm.; yellowish brown in colour ; pubescent, dull.

Head 1·3 times as wide as long ; distance between anterior margin of eye and epistome 1·5 times that between anterior margin of eye and base of head ; disc polygonally reticulate, apparently without punctures, covered with long setae, each seta being nearly as long as scape.

Pronotum 1·1 times as long as wide, at its widest 1·1 times as wide as head ; anterior and posterior angles obtuse but rounded distally ; surface of disc reticulate and with setae as on head.

Elytra at their widest as wide as pronotum, twice as long as their combined width, pygidium sometimes partially exposed dorsally ; striate and with rows of setae, setae slightly shorter than those of head and pronotum.

CONGO.

HOLOTYPE " Bas-Uele : Kotell 1–21.i.1925 Dr H. Schouteden " and 2 paratypes with the same data (Mus. R. Congo Belge) ; 1 paratype " Haut–Ovelle Env. de Madyu L. Burgeon 1919 " (Muséum National d'Histoire Naturelle, Paris).

VII. *MAGNOLEPTUS* gen. n.

Type species : *Magnoleptus pugnaceus* sp. n.

This genus differs from the closely related *Leptophloeus* Casey in several ways, the most important being the considerably larger size of the adults, the tarsal formula of 5–5–4 in the males as against 5–5–5 in *Leptophloeus*, the arrangement of the intervals on the elytra, the detailed structure and arrangement of the mesocoxal cavities and the rather nebulous difference in the surface appearance. The genus resembles small Passandridae in its general appearance.

Body flattened cylindrical or cylindrical in shape ; 3–5 mm.

Head as long as broad ; eyes small, situated one to two diameters in advance of base ; lateral line represented by raised ridge above and anterior to eyes, posterior to eyes the line obsolescent ; frontoclypeal suture obsolete ; epistome truncate anteriorly ; antennae with pedicel shorter than scape or third segment, otherwise filiform or almost imperceptibly enlarged distally.

Pronotum longer than broad, narrowed basally, anterior angles rounded or obtuse, hind angles obtuse to acute, sometimes obsolescent ; lateral line represented by a shallow groove closely approximated to an external raised ridge.

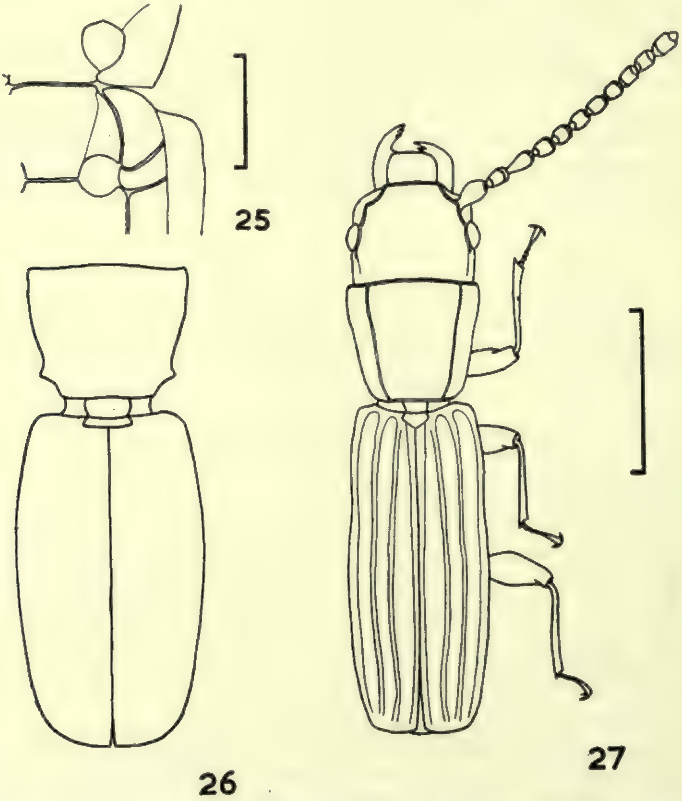
Scutellum pentagonal ; *elytra* more than 2·5 times as long as their combined width, sometimes more than three times ; carinate laterally, carina formed by outer margin of third cell ; three cells present, secondary intervals narrower than cells.

Genae normal ; *gular* sutures distinct ; anterior *coxal cavities* closed posteriorly, the coxae spherical, situated fairly close together ; intercoxal process of the prosternum straight or slightly convex posteriorly ; *metepisternum* not contributing to the mesocoxal cavities (Text-fig. 25) ; posterior margin of *mesosternum* straight ; median suture of the metasternum not reaching anterior margin of sclerite ; intercoxal process of first visible abdominal sternite narrow and rounded anteriorly, this sternite 1·5 times as long as second, second to fifth about equal to each other.

Legs subequal ; trochantero-femoral junctions of normal type ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

KEY TO SPECIES

1. Head and pronotum black in colour, rugosely punctured, not shining ; elytra parallel-sided and semi-truncate apically ; hind angles of pronotum very obtuse (Text-fig. 27) . . . . 2. **parallelicollis** sp. n. (p. 201)



FIGS. 25–27. (25) Front and middle coxal cavities of *Magnoleptus parallelicollis* ; (26) dorsal view of thorax and elytra of *M. pugnaceus* ; (27) dorsal view of *M. parallelicollis*.

Scale lines : Fig. 25 = 0·25 mm. ; Figs. 26, 27 = 1 mm.

– Head and pronotum blackish red, simply punctured, shining ; elytra diverging from their bases to just behind the mid-point and then narrowing somewhat ; apices evenly rounded to the apico-sutural angle ; hind angles of pronotum rectangular (Text-fig. 26) . . . . 1. ***pugnaceus*** sp. n. (p. 201)

1. ***Magnoleptus pugnaceus*** **sp. n.**

(Text-fig. 26)

3·0–5·0 mm.; body blackish red in colour except the tarsi which are less black.

Head as broad as or slightly broader across eyes than pronotum ; disc of head simply punctured, punctures somewhat elongate, separated by once to twice their diameter ; surface between punctures micro-reticulate ; almost devoid of setae.

Pronotum somewhat broader than long ; anterior angles rectangular and blunt, posterior angles very distinct and projecting ; puncturation and setation as on head.

Elytra about 2·25 times as long as their combined width, parallel-sided until mid-point and then narrowing somewhat apically, evenly rounded to apico-sutural angle ; third cell obsolete basally but well developed apically.

CONGO, RHODESIA, ANGOLA.

HOLOTYPE male " N.W. Rhodesia Kashitu, N. of Broken Hill ii–1915 H. C. Dollman " and the allotype with the same data ; paratypes : 1 " Angola 10656.42 Marco de Canavezes (Cubal da Ganda), district de Benguela, piège lum., iii–56 Ed. Luna de Carvalho " (British Museum (Natural History)) ; 1 " Mulungu, 1951 P. C. Lefevre 691 Coll. R. Mayné Com. et Bois Congo r.2371 ". The following paratypes were collected by Dr. K. Schedl : 1 Yangambi 15.x.1952 ; 3 Mulungu 5.viii.1952 ; 10 Yangambi 18.vii.1952 ; 1 Yangambi 21.x.1952 ; 2 Hembe-Bitale 18.vii.1952 ; 2 Ruanda Jhembe 29.vii.1952 (Mus. R. Congo Belge).

2. ***Magnoleptus parallelicollis*** **sp. n.**

(Text-fig. 27)

3·0–3·5 mm.; head and pronotum black, trophi, antennae, legs and elytra brownish black ; body quite cylindrical in section.

Head rugosely punctured, punctures elongate, intervals between punctures reticulate ; setae quite short.

Pronotum slightly longer than broad ; anterior angles obtuse and sharp, posterior angles very obtuse, almost obsolete ; puncturation and setation similar to that on head.

Elytra three times as long as their combined width, parallel sided, each elytron subtruncate apically.

CONGO.

HOLOTYPE male " Recolté dans cellule de bambous/I.R.S.A.C.—Mus. Congo Kivu : Uvira, Hte Luvubu 265 m 27–xii–1950 N. Leleup " and 2 paratypes with the same data (Mus. R. Congo Belge).

VIII. ***LEPTOPHLOEUS*** Casey

Leptophloeus Casey, 1916.
Truncatophloeus Kessel, 1921, **syn. n.**

Type species : *Laemophloeus angustulus* Leconte (by original designation).

This genus has been redescribed by Lefkovitch (1959*b*). Additions to that description follow: epistome rarely with tooth in mid-line or with two teeth; lateral line on *head* formed by raised ridge and closely approximated internal groove; *elytra* more or less parallel-sided; *genae* somewhat produced anteriorly; *gular* sutures obsolescent or obsolete; posterior border of intercoxal process of prosternum straight or very slightly concave posteriorly; *metepisternum* not contributing to mesocoxal cavity; *mesepimeron* just reaching cavity, *mesepisternum* contributing to cavity but limited to a small region laterally; median line of *metasternum* not reaching anterior third of sclerite; trochantero-femoral junctions of normal type; in two species (*L. problematicus* sp. n. and *L. cornutus* sp. n.) the hind tarsi of *males* four-segmented, otherwise 5-5-5.

Two species, *Laemophloeus mobilis* Grouvelle and *L. insularis* Grouvelle, are included in Kessel's (1921) subgenus *Truncatophloeus* of *Laemophloeus* which was defined merely by " Der Clypeus ist vorn gerade abgestützt ". Examination of the type specimens of both species has shown that they have the generic characters of *Leptophloeus*. I now select *Laemophloeus mobilis* Grouvelle as type species of *Truncatophloeus* Kessel which thereby becomes a junior synonym of *Leptophloeus* Casey; both of these species are now transferred to *Leptophloeus*, **comb. n.**

The species of this genus fall into three groups which are not sufficiently distinct to define as subgenera. The *clematidis* group includes the darkly coloured, rather elongate species with a tendency to rugose sculpturing on the head and prothorax; the *alternans* group include the brown (but occasionally black) species which are less elongate and which have simple puncturation without rugosity on the head and prothorax; the *problematicus* group is more distinct and includes those species having four-segmented hind tarsi in the males and with an unusual epistome. In other respects this last resembles the *alternans* group.

There remains the possibility that the *problematicus* species group does not properly belong to *Leptophloeus*; I am neither able to place them in any other genus nor find any difference in the structure of the adults which together with the curious epistomal structures and tarsal formula would justify the erection of a new genus to contain the species. They perhaps belong to a different subgenus from the other species here considered to belong to *Leptophloeus* but I would prefer to await the discovery of a third species, if one exists, before confirming or refuting this suggestion.

KEY TO AFRICAN SPECIES

1. Epistome produced into a tooth, horn or horns over the labrum 2
– Epistome not produced into a tooth or horns over the labrum but truncate or emarginate 4
2. Epistome with two lateral horns (Text-fig. 28); males with four-segmented hind tarsi . . . . 16. ***problematicus*** sp. n. (p. 210)
– Epistome with one more or less medial tooth; males with four- or five-segmented tarsi 3
3. Punctures on head separated by a distance less than their diameter; head with medial raised ridge; males with four-segmented hind tarsi (Text-fig. 29) 17. ***cornutus*** sp. n. (p. 210)
– Punctures on head separated by a distance greater than their diameter; head without medial raised ridge; males with five-segmented hind tarsi (Text-fig. 30) 4. ***opaculus*** (Grouvelle) (p. 205)
4. Epistome truncate or only very slightly emarginate anteriorly (Text-fig. 31) . 5

– Epistome strongly emarginate anteriorly (Text-figs. 32, 33) 10

5. Body black and shining 6

– Body brown and dull 7

6. Posterior angles of pronotum obtuse, clearly defined and somewhat projecting; head simply punctured . . . . 1. ***ater*** sp. n. (p. 204)

– Posterior angles of pronotum obsolete; head longitudinally rugosely sculptured 6. ***axillaris*** (Wollaston) (p. 206)

7. Head with median line raised above general surface into a ridge 14. ***bupleuri*** (Peyerimhof) (p. 209)

– Head, if with visible median line, the line is depressed 8

8. Elytra strongly carinate laterally, more than three times as long as their combined width . . . . 13. ***mobilis*** (Grouvelle) (p. 208)

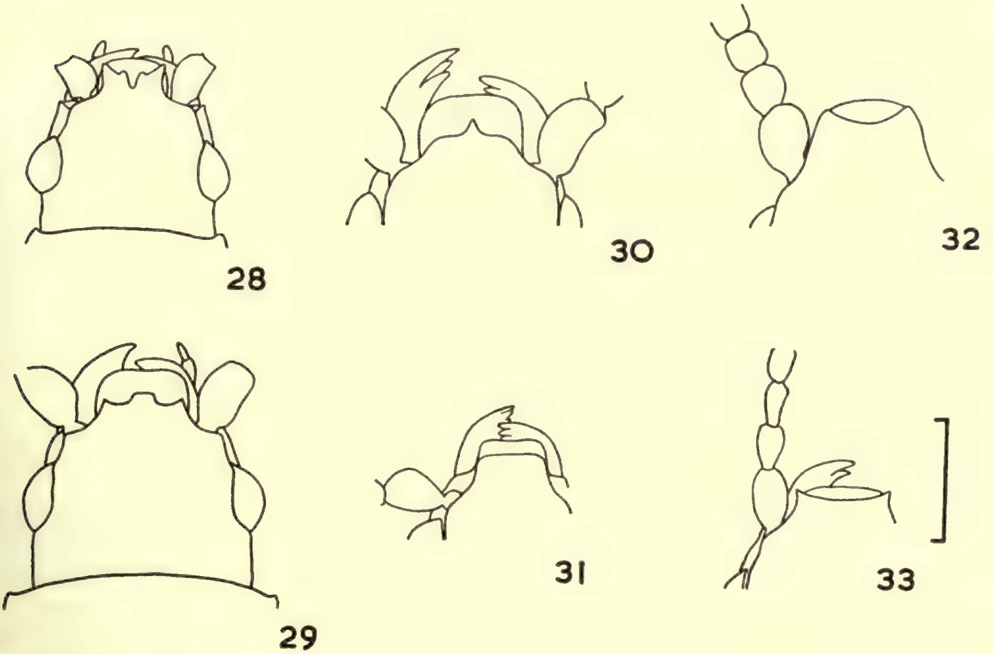
– Elytra abruptly deflected laterally but not carinate, about 2·5 times as long as their combined width 9

9. Head and pronotum longitudinally rugosely sculptured; eyes situated about one diameter in advance of the thorax; elytra at shoulders as broad as the prothorax, subtruncate apically . . . . 7. ***parallelus*** sp. n. (p. 206)

– Head and pronotum simply punctured; eyes almost contiguous with the prothorax, elytra at shoulders broader than the prothorax, broadly rounded apically 2. ***lucidus*** (Grouvelle) (p. 205)

10. Pronotum 1·5 times as long as the breadth between the posterior angles 8. ***mucunae*** sp. n. (p. 206)

— Pronotum at most 1·25 times as long as broad between the posterior angles . . 11



FIGS. 28–33. Heads of *Leptophloeus*; (28) *L. problematicus*; (29) *L. cornutus*; (30) *L. opaculus*; (31) *L. ater*; (32) *L. janeti*; (33) *L. punctatus*.

Scale line = 0·25 mm.

11. Elytra about 2·25 times as long as their combined width 12
— Elytra at most about twice as long as their combined width 14
12. Pronotum at most as long as broad . . . . 5. ***stenoides*** (Wollaston) (p. 206)
— Pronotum longer than broad 13
13. Body shining, reddish yellow in colour ; head more or less smooth between the punctures . . . . 9. ***cassavae*** sp. n. (p. 207)
— Body dull, brown in colour ; head reticulate between the punctures 10. ***linearis*** (Grouvelle) (p. 207)
14. Third segment of antennae narrower than second ; body dark brown in colour 11. ***punctatus*** sp. n. (p. 208)
— Third segment of antennae about as broad as second ; body yellow to brown in colour 15
15. Head and pronotum smooth between the elongate punctures 15. ***janeti*** (Grouvelle) (p. 209)
— Head and pronotum with longitudinal micro-sculpture between the more circular punctures . . . . 12. ***capitus*** sp. n. (p. 208)

It has not been possible to include 3. *L. anormus* (Grouvelle) in this key since it has neither been recognized from the description nor has the type been located (*infra*, p. 205).

The *alternans* Species Group (see p. 202)

1. *Leptophloeus ater* sp. n.

(Text-fig. 31)

This species is not unlike the European *L. alternans* (Erichson) in its general appearance but differs in that the colour is black, the eyes are more convex, the puncturation is coarser and the elytra are shorter in proportion to the rest of the body.

2·0 mm.; head, pronotum and elytra black, trophi, antennae and legs red.

Head across eyes slightly broader than long ; epistome truncate anteriorly ; antennae reaching basal third of elytra, last three segments enlarged to form a loose club, last segment twice as long as wide ; disc of head with large punctures, about one and a half times to twice diameter of an eye facet, somewhat elongate in shape ; punctures separated by a distance equal to once to twice their diameter basally, by twice to four times their diameter apically ; each puncture with a very short seta, or apparently glabrous.

Pronotum longer than wide (1·1 times) ; at its widest narrower than head across eyes (0·95 times) ; anterior angles obtuse and rounded ; posterior angles obtuse, sharp and somewhat projecting ; puncturation as on basal region of head, with very short setae or apparently glabrous.

Elytra twice as long as their combined width ; 1·1 times as broad as pronotum across shoulders, very slightly broader at mid-point ; each elytron separately curved to the apico-sutural angle, just leaving tip of pygidium exposed dorsally in mid-line ; with punctured striae, each puncture subtending a short seta.

CONGO.

HOLOTYPE and 1 paratype " Mulungu, 1951 P. C. Lefevre P. C. L. 642 " ; other paratypes : 1 " Mulungu 8–viii–1952 R. Mayné. R.M. 592A " ; 3 " Mulungu 5–viii–1952 Dr. Schedl Nr. 267 " (Mus. R. Congo Belge).

2. *Leptophloeus lucidus* (Grouvelle) comb. n.

Laemophloeus lucidus Grouvelle, 1908.

This species resembles *L. ater* sp. n. in almost all details and differs primarily from that species in the colour of the main part of the body which is brown and not black. Since Grouvelle's original description is very detailed, no further redescription will be given here.

EAST AFRICA, ETHIOPIA.

HOLOTYPE " Af. or All. Amani/Eichelbaum/Type [mss]/3h/Laemophloeus lucidus Grouv ty " and a Paris museum type label.

In addition to the holotype described from Dar-es-Salaam, the following specimens have been examined : 1 " Abyssinia : Djem-Djem Forest nearly 9,000 ft. 1–x–1925 Dr. H. Scott " ; 1 " Abyssinia/Schimper 430–50 ".

3. *Leptophloeus anormus* (Grouvelle) comb. n.

Laemophloeus anormus Grouvelle, 1923.

Although the type specimen of this species has not been located in either the Grouvelle or the Alluaud collections, the original description presents sufficient information to establish that the species properly belongs to *Leptophloeus*. Grouvelle wrote that the species is related to *L. janeti* (Grouv.) and *L. axillaris* (Woll.), being distinguished from the former by the truncate epistome and from the latter by the more slender antennae, the more elongate body and an emargination at the outside of the base of the prothorax. I have not been able to recognize specimens of a species resembling *L. janeti* and *L. axillaris*, but differing from them as given and agreeing with the rest of the description of *L. anormus*. In my key to species of *Leptophloeus* (*supra*, p. 202), *L. anormus* would probably be identified as *L. lucidus* (Grouvelle).

KENYA.

According to the original description, the species was found " Rivière Amboni dans la zone des prairies inferieures du mont Kenya, alt. 2,000 m." by Alluaud.

4. *Leptophloeus opaculus* (Grouvelle) comb. n.

(Text-fig. 30)

Laemophloeus opaculus Grouvelle, 1908.

This species resembles *L. lucidus* fairly closely but differs in the epistome having a pointed tooth in the mid-line. In other respects, this species resembles the species of the *alternans* group. The figure of the head (Text-fig. 30) will enable accurate recognition of the species. Since only the type is known, there remains the possibility that this specimen is an abnormal individual of another species. The shape of the prothorax, however, with its projecting, slightly acute hind angles is unlike that of any other African species of the genus.

EAST AFRICA.

HOLOTYPE " Afr. or. All. Amani Eichebaum [*sic*] Type/*Laemophloeus opaculus* Grouv. ty."

5. *Leptophloeus stenoides* (Wollaston) comb. n.

Laemophloeus stenoides Wollaston, 1854.

Resembles *L. alternans* (Erichson) very closely but differs in the greater emargination of the epistome and in having the surface of the head and of the pronotum polygonally reticulate upon a moderately rugose sculpturing.

The surface is so distinct in this species as to distinguish it completely from other *Leptophloeus* occurring in Africa.

MADEIRA.

HOLOTYPE, the only specimen seen, is in the Wollaston collection (British Museum (Natural History)). It has a British Museum type label and " Laemophloeus stenoides, type Woll " in a handwriting I do not recognize but which may be that of Arrow.

The *clematidis* Species Group (see p. 202)

6. *Leptophloeus axillaris* (Wollaston) comb. n.

Laemophloeus axillaris Wollaston, 1854.

This species resembles *L. clematidis* in its general appearance but is reddish black rather than brown in colour, shining rather than dull ; the humeral region of the elytra is slightly redder than the remainder.

Eyes situated very far in advance of base of head, very small ; head large in proportion to remainder of body, as long as broad ; surface rugosely punctured, the sculpture tending to run into longitudinal ridges ; very slightly pubescent ; median line slightly impressed.

Pronotum as long as broad, slightly narrowed basally ; anterior angles obtuse, posterior so obtuse and rounded as to be obsolete ; surface punctured as on head.

MADEIRA.

HOLOTYPE a single specimen in the Wollaston collection (British Museum (Natural History)). It has a British Museum type label and " Laemophloeus axillaris, type Woll " in a handwriting I do not recognize but which may be that of Arrow. I have not recognized further specimens of this species.

7. *Leptophloeus parallelus* sp. n.

Although belonging to the *clematidis* group of the genus, this species is most likely to be confused with *L. lucidus* (Grouvelle) ; the distinguishing characters presented in the key to species should prove adequate to prevent any confusion between these two species. However, *L. parallelus* is very closely related to *L. axillaris* (Wollaston) from which it differs in colour and distribution ; *L. axillaris* is reddish black in colour and occurs in Madeira whereas *L. parallelus* is brown (albeit dark) and occurs in the Congo.

CONGO.

HOLOTYPE and 1 paratype " Luki 5–vi–1952 Dr. Schedl s.136 " (Mus. R. Congo Belge).

8. *Leptophloeus mucunae* sp. n.

This species can be distinguished from its nearest relatives by the characters outlined in the key to species.

1·5–2·0 mm.; body brownish red in colour, moderately shining.

Head transverse, 1·6 times as wide as long ; epistome concave anteriorly ; antennae rather short, hardly reaching base of pronotum, last three segments enlarged forming a loose club, last segment at most 1·5 times as long as broad ; surface of disc punctured, punctures twice as large in diameter as facet of an eye, separated by a distance equal to less than one diameter ; each puncture subtending a small seta ; surface between punctures somewhat irregular (not reticulate but tending towards micro-rugosity) and shining.

Pronotum considerably narrowed basally, maximum width slightly broader than head, 1·5 times as long along mid-line as broad between hind angles ; anterior angles obtuse, posterior obtuse and somewhat projecting ; surface of pronotum as coarsely and closely punctured as on head.

Elytra 2·3 times as long as their combined width, at shoulders narrower than pronotum at broadest ; together evenly rounded apically, not leaving last abdominal segment exposed dorsally ; the three cells developed, secondary intervals being very narrow ; with punctured striae.

UGANDA, CONGO.

HOLOTYPE and 3 paratypes : " Velvet bean seed/Uganda, Kampala –xi–1932 H. Hargreaves " (British Museum (Natural History)) ; 1 " Miss. H. de Saeger 3787 " (see Appendix) (Mus. R. Congo Belge).

9. *Leptophloeus cassavae* sp. n.

This is a comparatively small species of the genus ranging from 1·6–1·9 mm. It resembles *L. alternans* (Erichson) and *L. lucidus* (Grouvelle) in many ways but differs in that the body is somewhat more slender than in those species, thus resulting in, for instance, the pronotum being slightly longer than broad ; the epistome is emarginate anteriorly and not truncate ; the puncturation of the head is coarser than the facets of the eyes and not finer ; the antennae resemble those of *L. alternans* rather than those of *L. lucidus* although the difference between the antennae is very slight ; in other respects the three species appear to be identical externally.

HOLOTYPE and 3 paratypes " Sierra Leone. Njala Ex Cassava branch ix–1935 E. Hargreaves " (British Museum (Natural History)).

10. *Leptophloeus linearis* (Grouvelle) comb. n.

Laemophloeus linearis Grouvelle, 1908.

In the key to African Laemophloeinae presented by Grouvelle (1908), this species and *L. punctatus* sp. n. would be identified as *L. hypobori* (Perris). Nevertheless, the differences between them and *L. hypobori* are considerable.

The following differences between *L. linearis* and *L. clematidis* will serve as a description of the species : in *L. linearis* segments of antennae elongate, eyes moderately convex, pronotum broadest just behind anterior angles, elytra as broad across shoulders as pronotum at widest, general surface less pubescent than in *L. clematidis* where antennal segments transverse, eyes hardly convex, pronotum broadest at anterior third and elytra broader across shoulders than pronotum at widest.

CONGO, ETHIOPIA.

HOLOTYPE " Abyssinie/Type/*L. linearis* A. Grouv." Other specimens seen include 7 " Ituri : Djugu ii–1935. H. J. Bredo " ; 1 " Kivu : NGweshe v–1938 J. Ghesquière " ; 1 " Kivu : Terr. Kabare Nyakasiba, 1800 m (vestige forêt) vi–1951 N. Leleup " ; 1 " N. Kivu : Loashi viii–1937 J. Ghesquière " ; 1 " Uganda :

Bugiri, 1400 m savane boisée 5/8–viii–1957 P. Basilewsky et N. Leleup " (Mus. R. Congo Belge).

11. *Leptophloeus punctatus* sp. n.

(Text-fig. 33)

This species resembles the preceding, differing only in the following details : in general shape body less flattened, almost cylindrical ; elytra about twice as long as their combined width, punctures on head and pronotum simple, surface without any rugosity.

CONGO.

HOLOTYPE " Galerie forestière de la Kisanga dans humus. Environ d'Elisabethville. Septembre 1948 N. Leleup " ; paratypes : 1 " Recolté dans l'humus (forêt de Hagenia)/Kivu : Terr Kabare, contrel S.E. Kahuzi, 2080 m 13–viii–1951 N. Leleup " ; 2 " Sur *Lobelia*/Kiball-Ituri : Mont Bughera 2200 m xi– 1953 R. R. P. P. Bergmans-Celis " ; 1 " Dans inflorescences de *Lobelia*/N. Kivu : env. Lubero, 2300 m 6–viii–1953 R. P. M. J. Celis & Coll." ; 1 " Kwesi & Kilo 10/19–iv–1911 Dr. Bayer " ; 1 " Ituri La Moto ; Madyu L. Burgeon " ; 1 " Miss. H. De Saeger 3787 " ; 1 " Miss. H. de Saeger 1724 " (see Appendix) (Mus. R. Congo Belge).

12. *Leptophloeus capitus* sp. n.

This species resembles *L. punctatus* sp. n. in most respects but differs as follows : antennal segments at most as broad as long, median line on the head visible although not deep, punctures on the head separated by one or two diameters whereas *L. punctatus* has the antennal segments longer than broad, the median line of the head obsolete and distance between punctures on head equal to half to once their diameter.

SOUTH AFRICA.

HOLOTYPE " Port St. John, Pondoland Sept. 1923/S. Africa R. E. Turner " and 1 paratype with the same data (British Museum (Natural History)).

13. *Leptophloeus mobilis* (Grouvelle) comb. n.

Laemophloeus mobilis Grouvelle, 1908.

Head as broad as long, eyes somewhat projecting ; antennae reaching basal quarter of elytra, terminal three segments at most 1·5 times as long as broad ; surface of disc with elongate punctures separated by narrow ridges, almost rugose ; with fine, narrow longitudinal reticulation between the punctures.

Pronotum just narrower than head across eyes, slightly longer than broad, weakly narrowed basally ; lateral line represented by ridge and internal groove, the latter deeper in mid-region than anteriorly or posteriorly ; anterior angles obtuse and blunt, posterior angles obtuse and rounded ; surface as on head.

Elytra at shoulders slightly broader than pronotum at its widest, broadening until basal eighth and then parallel-sided until apical third, then evenly rounded together ; 2·5 times as long as their combined width ; the three cells developed, secondary intervals being half width of cells.

EAST AFRICA, CONGO.

The single male in the Grouvelle collection is selected as lectotype and is labelled " Zanzib./Type/*Laemophloeus mobilis* Grouv. ty." There is another syntype in the Deutsches Entomologisches Institut. I have seen 1 other specimen "Congo Belge Hembe-Bitale 19–viii–1952 Dr. Schedl" (Mus. R. Congo Belge).

14. ***Leptophloeus bupleuri*** (Peyerimhof) **emend. comb. n.**

Laemophloeus bupleri Peyerimhof, 1948.

This species was called *bupleri* in the original description but was referred to as *bupleuri* elsewhere in the paper and was named after *Bupleurum spinosum* L. The spelling *bupleri* is quite clearly an error and is here corrected.

L. bupleuri belongs to the *clematidis* group of *Leptophloeus* but is unique in having the median line of the head raised into a strong ridge. The head is otherwise rugose, slightly longer than broad ; the antennae do not reach the base of the pronotum ; the front angles of the pronotum are obtuse, the hind angles so obtuse as to be obsolescent ; pronotum just broader than the head, about 1·25 times as long as broad ; elytra at shoulders slightly broader than the pronotum, about 2·25 times as long as their combined width, leaving the tip of the abdomen exposed dorsally.

ALGERIA.

There are five syntypes, two mounted on one card with the data " Agouni Boussouil Djuidjusa vi–vii–1947/Bupleurum spinosum/Laemophloeus Bupleuri Peyerh. TYPES 1–2 " ; two mounted on separate cards but on one pin have data as above but " TYPES 3–4 " ; the fifth is mounted alone and has the same data except for " TYPE 5 ". The specimen implied by TYPE 1 is selected as lectotype.

15. ***Leptophloeus janeti*** (Grouvelle)

(Text-fig. 32)

Laemophloeus janeti Grouvelle, 1899.

L. janeti resembles *L. capitus* sp. n. very closely, both these species differing from *L. punctatus* sp. n. in being yellow rather than chestnut in colour and in the ratio between the length of the elytra to the length of the head and pronotum combined being 1·4 or less in contrast with the figure of 1·6 in *L. punctatus*. In addition to the characters given in the key, *L. janeti* differs from *L. capitus* in having the secondary intervals and to a lesser extent the raised regions between the strial punctures yellow in colour whereas the elytra of *L. capitus* are a uniform reddish yellow.

Two specimens in the Grouvelle collection, Paris, bear printed data labels as follows : " Museum Paris/Congo/Libreville/H. Lecomte 56–97 ". One of these two specimens bears the word " type " in Grouvelle's later handwriting in his usual purple ink ; the other has a ms. label " *Laemophloeus Janeti* Grouv." in Grouvelle's early handwriting in black ink. In his original description Grouvelle gave as locality the following information : " Congo : Libreville. Museum de Paris et collection A. Grouvelle.—Espèce decouverte a Paris dans une noix de Cacao, contentant un nid de *Monomorium floricola*, envoyée au Museum par M. Lecomte ". Consequently, I feel confident that the two specimens indicated above are syntypes. I select the specimen bearing the name " *Laemophloeus Janeti* Grouv." as lectotype. The other specimen is rather smaller than is usual for the species.

It is interesting to note that this species, when correctly recognized in stored products, has always been associated with cocoa and coffee beans.

I have seen specimens from throughout the CONGO and from UGANDA and GHANA.

The *problematicus* Species Group (see p. 202)

Two species belong here, *Leptophloeus problematicus* sp. n. and *L. cornutus* sp. n., which appear to be unique in the genus in possessing four-segmented tarsi in the hind legs of the male.

16. *Leptophloeus problematicus* sp. n.

(Text-fig. 28)

The following differences from *L. janeti* (Grouvelle) will serve as a description of this very distinct species : colour brown rather than red, puncturation coarse, close ; epistome produced into a plate and two horns over labrum.

CONGO.

HOLOTYPE male and 3 paratypes : " Yangambi 18–vii–1952 Dr. Schedl Nr. 468 " ; other paratypes : 7 " Yangambi 15–x–1952 Dr. Schedl Nr. 468 " (Mus. R. Congo Belge).

17. *Leptophloeus cornutus* sp. n.

(Text-fig. 29)

This species resembles *L. problematicus* sp. n. very closely, differing primarily in the structure of its epistome which in *L. cornutus* has a short sharp median horn contrasting with the plate and two horns to be found in *L. problematicus*.

CONGO.

HOLOTYPE and 1 paratype " Yangambi 18–vii–1952 Dr. Schedl Nr. 468 " ; other paratypes : 4 " Yangambi 15–x–1952 Dr. Schedl Nr. 468 " ; 1 " Luki 12.vi.1952 Dr. Schedl s.164a " ; 2 " Luki 5–vi–1952 Dr. Schedl s.136 " ; 1 " Luki 11–vi–1952 Dr. Schedl s.195 " ; 1 " Yangambi 9–ix–1952 Dr. Schedl Nr. 802 " ; 1 " Sankuru : Lodja 10–v–1929 J. Ghesquière " (Mus. R. Congo Belge).

IX. *NARTHECIUS* Leconte

Narthecius Leconte, 1861.
Paraphloeus Sharp, 1899 **syn. n.**

Type species : *Narthecius grandiceps* Leconte (by monotypy).

Body cylindrical.

Head longer than broad ; epistome acuminate apically, epistome symmetrically or asymmetrically produced over labrum into narrow horn ; head longitudinally shallowly grooved on each side of horn between horn and insertion of antennae, with a raised ridge on outside in some species ; eyes situated well in advance of base, flush with the surface of the head or hardly convex, with moderately large facets ; antennae inserted just below lateral carinae at base of acumination, with terminal three segments broader than remainder, with scape in some species an irregular isoseles triangle in shape, pedicel being inserted at external apical angle, in other species scape almost spherical ; frontoclypeal suture obsolete ; lateral carinae represented by raised ridge ; an impressed median line usually present ; gular sutures distinct and well separated ; *genae* moderately produced but negligibly so when compared with Passandridae, *Prostomis* or *Passandrophloeus* ; *labrum* transverse, shallowly emarginate anteriorly.

Pronotum longer than broad, as long as or shorter than head ; suture between the pronotum and the pleural sclerites not lateral but lateroventral, sometimes partially visible from above ; anterior angles rounded, posterior obtuse and well defined ; lateral line represented by raised ridge and internal groove.

Scutellum more or less semicircular ; *elytra* parallel-sided, about twice as long as their combined width, about 1·5 times as long as pronotum ; the three cells developed, secondary intervals being as broad as cells or narrower.

Anterior *coxal cavities* open posteriorly, situated close together ; intercoxal prosternal process convexly rounded posteriorly ; *mesosternum* very small and consisting of a narrow strut posteriorly between middle coxae ; *meso-* and *metepisterna* not contributing to mesocoxal cavities, these being formed by *meso-* and *metasterna* with *mesepimeron* ; *metasternum* equal in length to first four visible abdominal sternites combined ; first visible abdominal sternite 1·5 times as long as second in mid-line, its intercoxal process narrow, sharply rounded anteriorly ; second to fourth sternites about equal to each other, fifth longer but not as long as first.

Legs rather short, almost warranting description as brachypodous ; trochantero-femoral junctions of normal type, femora strongly dilated ; tibiae sinuate ; tarsal formula 5–5–5 in both sexes ; in some (American) species the paired apical spines on tibia asymmetrically developed on the front legs, symmetrically on the others.

Paraphloeus Sharp was erected to contain two species from Central America ; the type species, *P. crassiceps* Sharp, quite clearly is a *Narthecius*, probably conspecific with *N. grandiceps* and is now placed in that genus **comb. n.** The other species, *P. longicollis* Sharp, belongs to a different group within the Laemophloeinae meriting generic status. In contrast with Sharp's opinion, *Paraphloeus* has five tarsal segments in each leg and not four (or three, as he claimed to be present in the front legs). The basal segment is almost entirely withdrawn (in dried specimens, at least) into the tibia and is hardly, if at all, shorter than the second ; what little protrudes from the shaft is normally hidden by the spurs, spines, knobs and setae with which the tibia is ornamented in this region.

I have neither been able to see the type of nor recognize *N. haroldi* Reitter, described from Madagascar. Its description suggests that it is not *Narthecius* but is more related to the Oriental *N. suturalis* Grouvelle which, as indicated below, is considered to belong to a genus distinct from *Narthecius*. *N. haroldi* would appear to be distinguished from the species described below as follows :

Epistome asymmetrically acuminate anteriorly . .	***N. schedli*** sp. n. (p. 211)
Epistome weakly curved anteriorly	***N. haroldi*** Reitter

Narthecius schedli sp. n.

(Text-figs. 34, 35)

About 1·8 mm.; body reddish brown in colour, elytra less intensely so.

Eyes slightly convex, situated 1·5 times their diameter in advance of base ; surface of head with slightly longitudinally elongate punctures, not very much smaller to half the diameter of facets of eyes, separated by about one diameter ; surface between punctures minutely polygonally reticulate ; apparently without setae.

Pronotum about 1·25 times as long as broad, slightly longer than head ; surface as on head ; *elytra* about 2·5 times as long as their combined width, parallel-sided until apical third, there gently turning inwards and evenly rounded to apico-sutural angles ; strial punctures very minute, each with a thin short seta.

CONGO.

HOLOTYPE " Congo Belge Yangambi 25–ix–1952 Dr. K. Schedl Nr. 961 " ; paratypes collected in same locality but on different dates : 1, 24–vi–1952 (S.215) ; 1, 30–vi–1952 (S.265) ; 2, 24–ix–1952 (R.944) ; 2, 31–x–1952 (R.949) (Mus. R. Congo Belge).

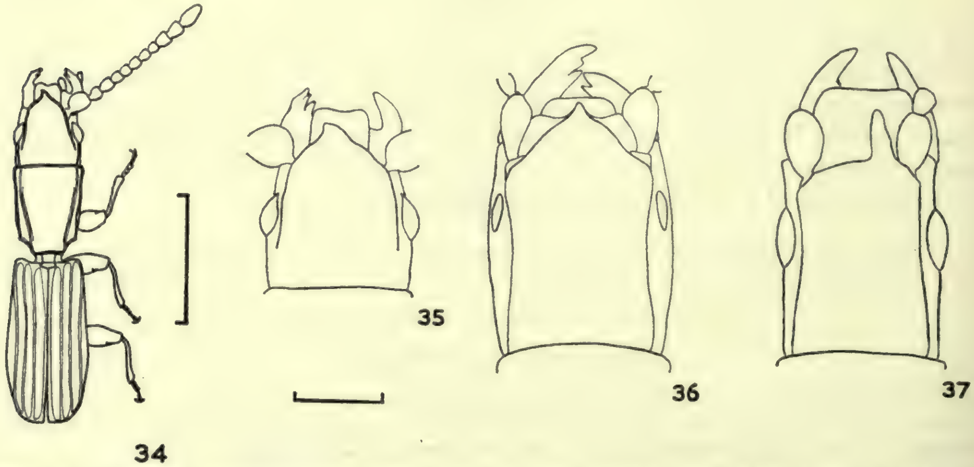
It is rather difficult to know with which species to compare *N. schedli.* The American members of the genus are very different in their body form and can easily be distinguished as a group by the following key. Those from the Oriental region which are more closely related are as yet undescribed (*N. suturalis* Grouvelle is probably generically distinct). The following key will indicate the most obvious differences :

1. Eyes situated three diameters in advance of the base, hardly, if at all, convex ; scape large and irregularly triangular in shape ; grooves on each side of the frontal horn ridged externally ; epistomal horn centrally placed (Text-fig. 36) American ***NARTHECIUS***

– Eyes situated 1·5 diameters in advance of the base, slightly convex ; scape globular ; grooves on each side of the frontal horn not ridged externally but merging with the general surface of the head ; epistomal horn asymmetrically placed . . . 2

2. Epistomal horn with a narrow base, the head otherwise hardly produced anteriorly to the antennal insertions (Text-fig. 37) . . . . Oriental ***NARTHECIUS***

– Epistomal horn with a broad base, the head being clearly produced anteriorly to the antennal insertions (Text-fig. 35) . . . . . . ***N. schedli*** sp. n.



FIGS. 34–37. (34) Dorsal view of *Narthecius schedli* ; (35) head of *N. schedli* ; (36) of American *Narthecius* and (37) of Oriental *Narthecius.*

Scale lines : Fig. 34 = 1 mm. ; Figs. 35–37 = 0·25 mm.

X. *PASSANDROPHLOEUS* Kessel

Passandrophloeus Kessel, 1921.

Type species : *Laemophloeus spinosus* Grouvelle (present designation).

This genus could easily be confused with *Leptophloeus* but can be easily recognized by the ventral structure of the head, the anterior coxal cavities (Text-fig. 38), the shape of the intercoxal process of the first abdominal sternite in addition to the characters given in the key to genera.

Of the seven species listed by Kessel in *Passandrophloeus*, I select *spinosus* Grouvelle as the type species. This species is very similar to the single African species redescribed below and may prove to be conspecific.

Body moderately flattened ; 2–4 mm.

Head in *male* triangular in general shape (Text-fig. 40) ; eyes situated in advance of base, a distinct ridge present behind eye ; width of head across eyes more than that of pronotum at widest ; head in *female* less obviously triangular in shape (Text-fig. 41) ; eyes almost in contact with the base, no distinct ridge behind eye ; width across eyes rarely as much as that of pronotum ; in both sexes, frontoclypeal suture and median line obsolete ; epistome truncate anteriorly ; antennae with scape, pedicel and terminal three segments distinctly larger than other six segments ; two lateral lines on each side, inner one depressed, outer one ridged and anteriorly forming margin to epistome ; external region of mandibles in *male* produced ventrally and laterally, this production often reaching to beneath produced genae ; in *female* mandibles not produced externally lateroventrally.

Pronotum with indistinct obtuse anterior angles and with distinct acute posterior angles ; two lateral lines on each side, inner consisting of internal shallow groove and external ridge, outer essentially a groove between ridge of inner line and a secondary ridge ; this outer groove may consist of a row of largish punctures behind mid-line ; the outer ridge is recurved externally in front, then runs posteriorly close to lateral margin.

Scutellum triangular ; *elytra* carinate laterally, the three cells developed, the carinal fold being closely approximated to outer margin of third ; apices of elytra usually truncate in *male*, with external apical angles turned outwards ; apices sometimes describable as truncate in *females* but usually evenly rounded to suture.

Genae normal in *female*, in *male* this region developed ventrally and slightly laterally into a heavy jowl on each side (Text-fig. 39) ; *gular* sutures distinct ; anterior *coxal cavities* closed behind, each with a lateral extension ; intercoxal process of prosternum concave posteriorly ; coxae well separated ; *metepimera* not contributing to mesocoxal cavities ; intercoxal process of first abdominal sternite almost straight anteriorly ; *metasternum* about as long as first three abdominal sternites ; first abdominal sternite twice as long as second, second to fourth about equal in length to each other, fifth somewhat longer ; trochantero-femoral junctions of the normal type ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

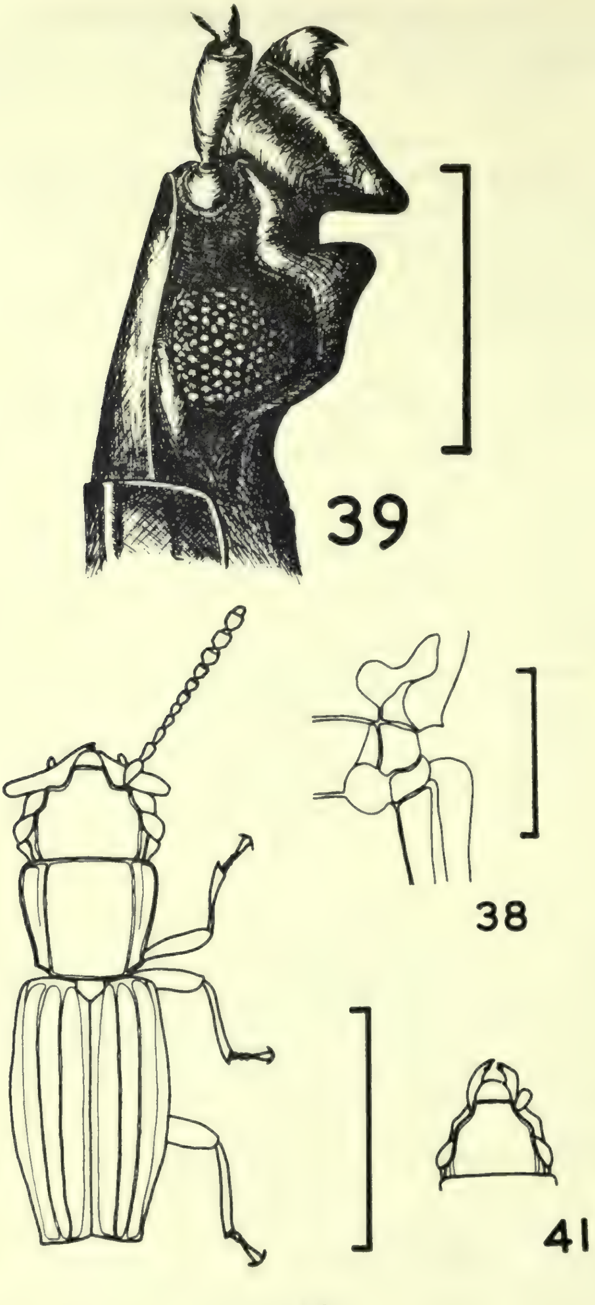
Passandrophloeus glabriculus (Grouvelle) comb. n.

(Text-figs. 39–41)

Laemophloeus glabriculus Grouvelle, 1897.
Laemophloeus divergens Grouvelle, 1908 **syn. n.**

This species is fairly widespread in the Oriental and African regions and appears to be associated with trees of the Dipterocarpaceae.

About 2 mm.; *head, antennae, pronotum* and *legs* yellowish red in colour, *elytra* essentially the same colour but since they are transparent or almost so, they appear to be a dirty white over the metathoracic wings.



FIGS. 38–41. *Passandrophloeus glabriculus*; (38) Front and middle coxal cavities; (39) lateral view of head of male; (40) dorsal view of male; (41) dorsal view of head of female.

Scale lines: Figs. 38, 39 = 0·25 mm.; Figs. 40, 41 = 1 mm.

Punctures on *head* and *disc* of *pronotum* slightly smaller in diameter than facet of eyes, separated by once to four times their diameter, each with a seta about two diameters in length.

Pronotum about as long as broad, narrowed basally ; elytra at shoulders as broad as pronotum apically, broadening until just posterior to their mid-point where, in *male*, they are as broad as head across eyes and in *females*, broader than head ; first strial interval of *elytra* in addition to contributing to first cell, possesses a row of punctures situated quite close to suture ; the three cells each with row of punctures in addition to two punctured striae ; secondary intervals very narrow (these are presumably what Grouvelle in his original description, called the striae since he described each elytron as having three striae).

In the Grouvelle collection there are three males, which I consider to be syntypes of this species : two are mounted together and bear the data " Sumatra Deli/Type [black printed on white]/Laemophloeus glabriculus Grouv ty ". The lectotype, which I now select, is the male on the right and has been indicated by the figure 2 on the card. The remaining paralectotype bears the data " Sumatra tabac/Type [black printed on white] ".

The holotype of *L. divergens* bears the following data ; " Af. or. All. Amani/Eichelbaum/Type [mss]/Laemophloeus divergens sp. nv. Grouv." and a Paris museum type label. When examined it was found to be the same species as *P. glabriculus*. Lefkovitch (1957*a*) gave a record of this species arriving at a British port on dunnage from West Africa, which suggested that the species, previously known only from Sumatra, occurred in Africa. The following data on the specimens given below confirms that the species does in fact occur there.

CONGO, WEST AFRICA.

1 " Yangambi, 1951 C. Donis z.309 Com. et Bois Congo r.2326 " and 3 other specimens whose data are identical but for z.307, 306, 316 ; 1 " s/Grumes Boma (quai) x–1945 J. Vrydagh " ; 14 specimens " Eala viii–1935 J. Ghesquière 708 " ; (Mus. R. Congo Belge). Five specimens (author's collection) " Palm kernels loaded Apapa 23–i–1957 next to damp, moulding logs ss.Martita collected 18.ii.1957 R. C. Welch at Bristol " (these last are the specimens referred to in Lefkovitch, 1957).

Certain other species hitherto placed in *Laemophloeus* properly belong to this genus, namely *Passandrophloeus ditomoides* (Grouvelle) **comb. n.**, *P. spinosus* (Grouvelle) **comb. n.** and *P. falcidens* (Grouvelle) **comb. n.**

XI. *MESTOLAEMUS* gen. n.

Type species : *Mestolaemus longicornis* sp. n.

The beetles belonging to this curious genus can be distinguished at once from other African Laemophloeinae by the very deep outer emargination on the front of the head.

1·5 mm.; body flattened.

Head broader than long ; eyes moderate in size, situated just more than one diameter in advance of base ; frontoclypeal suture obsolete ; epistome emarginate anteriorly, between epistome and insertions of antennae two further emarginations on each side, outermost very deep ; lateral raised line present and additional short line present behind eye ; antennae with all segments elongate, in total longer than body.

Pronotum with lateral line carinate, this line without a fovea along its length.

Scutellum flatly triangular ; *elytra* with the three cells ; the usual inflected lateral region typical of Laemophloeinae hardly deflected but explanate.

Genae not produced ; *gular* sutures distinct ; anterior *coxal cavities* narrowly closed behind, coxae spherical and well separated from each other ; *mesepimeron* contributing appreciably to mesocoxal cavity ; *metasternum* about equal in length to first two abdominal sternites ; intercoxal process of first abdominal sternite straight anteriorly ; first abdominal sternite twice as long as second in mid-line, second to fourth subequal, fifth slightly longer ; in overall shape, abdominal sternites strongly convex, abdomen consequently semicylindrical in shape ; legs subequal in length ; trochantero-femoral junctions of normal type ; hind femora slightly more dilated than others ; tarsal formula 5–5–5 in *male*, *female* unknown (probably 5–5–5).

***Mestolaemus longicornis* sp. n.**

(Text-fig. 43)

1·5–2·0 mm.; body very flattened ; reddish yellow in colour.

Head transverse, about twice as broad as long ; labral emargination shallow ; region between outer deep emargination and eye strongly produced above antennal insertion ; scape about twice as long as broad, other segments three to four times as long as broad ; all segments of antennae about as long as each other, antenna about equal to body in length ; last three segments hardly if at all broader than those preceding ; surface closely and evenly punctured, diameter slightly less than that of an eye facet, separated by half to one and a half times this distance, each with a short, stout seta about equal to one and a half diameters in length ; surface between punctures smooth and shining.

Pronotum at the acute, produced anterior angles as broad as head, twice as broad as long ; posterior angles slightly obtuse ; lateral margin (including anterior angles) with about six rounded teeth, these being more strongly developed anteriorly ; lateral line formed by a raised ridge ; sublateral region explanate ; surface with puncturation and setation as on head.

Elytra oval in shape, broadest at their mid-point, there slightly broader than pronotum, slightly longer than their combined width ; cells with two or three rows of punctures additional to striae ; each elytron carinate laterally, sublateral region explanate ; setae as long as those on head and pronotum.

WEST AFRICA, ANGOLA.

HOLOTYPE male " Angola 1493,18.2./Rives Chumbe, 40 km. E. de Dundo, galerie for., detritus sol. 15–v–1949. A. de Barros Machado " (British Museum (Natural History)) ; 1 paratype male " IFAN-1946 Tonkoui C.I. 900–1200 m. A. Villiers Forêt Prim. 20–30.ix " (Muséum National d'Histoire Naturelle, Paris).

XII. ***MARIOLAEMUS* gen. n.**

Type species : *Laemophloeus misellus* Grouvelle.

1·5–2·3 mm.; body only slightly flattened and rather broader in general build than is usual in the subfamily.

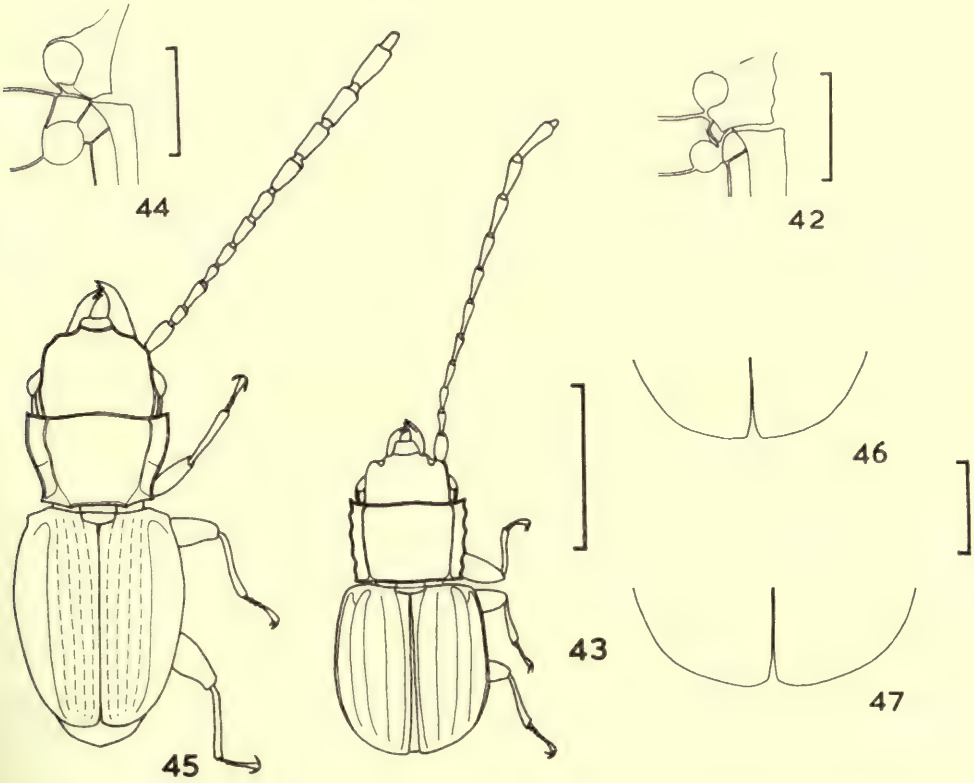
Head somewhat transverse ; eyes moderate in size, situated in advance of base ; frontoclypeal suture obsolete ; epistome trisinuate ; mouthparts projecting ; antennae elongate, not clubbed, segments increasing in length from fourth to eleventh ; third segment longer than either second or fourth ; lateral line represented by raised ridge ; a short additional line behind eye present.

Pronotum transverse, narrowed basally, anterior and posterior angles acute ; lateral line represented by raised ridge, broadening laterally at base ; just behind mid-point in sublateral region a deeply impressed line with posterior obliquity.

Scutellum transversely pentagonal ; *elytra* rarely twice as long as their combined width, usually only one and a half times or somewhat less ; first cell strongly margined internally at base, other cells weakly developed ; greater part of last abdominal tergite often exposed dorsally.

Genae normal ; *gular* sutures distinct ; anterior *coxal cavities* closed posteriorly, circular but *coxae* very clearly transverse internally ; prosternal intercoxal process concave posteriorly ; *metepisternum* not contributing to mesocoxal cavity ; intercoxal process of first visible abdominal sternite slightly curved anteriorly ; *metasternum* about as long as first two abdominal sternites ; first abdominal sternite twice as long as second, second to fourth subequal in length, fifth somewhat longer, trochantero-femoral junctions of normal type ; legs subequal ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

This genus is not unlike *Phloeipsius* Casey in its general appearance, but the two are not really closely related. *Mariolaemus* can be distinguished from *Phloeipsius* by the strongly formed frontoclypeal suture and the greater degree of flattening in the body. *Mariolaemus* can be distinguished from other African genera by the characters given in the key.



FIGS. 42–47. (42) Front and middle coxal cavities of *Mestolaemus longicornis* ; (43) dorsal view of *M. longicornis* ; (44) front and middle coxal cavities of *Mariolaemus misellus* ; (45) dorsal view of *M. misellus* ; (46) apices of elytra of *M. escalerae* and (47) of *M. misellus*.

Scale lines : Figs. 42, 44, 46, 47 = 0·25 mm. ; Figs. 43, 45 = 1 mm.

KEY TO SPECIES

1. Elytra about 1·5 or more times as long as their combined width 2
– Elytra less than 1·45 times as long as their combined width 3
2. Head with a striole at the base of the antennae ; body slightly convex 1. ***livens*** (Grouvelle) (p. 218)
– Head without a striole at the base of the antennae ; body distinctly convex (blackish red in colour, with a shining region at the base of the antennae) 4. ***eichelbaumi*** (Grouvelle) (p. 219)
3. Elytra of greatest length at their apico-sutural angles (Text-fig. 46) ; abdomen usually entirely covered by the elytra ; elytra at their broadest wider than the pronotum at its maximum width . . . . 3. ***escalerai*** (Grouvelle) (p. 219)
– Elytra of greatest length between their external and their apico-sutural angles and the base ; tip of abdomen often exposed dorsally ; elytra at their broadest as broad as the pronotum at its widest . . . 2. ***misellus*** (Grouvelle) (p. 218)

1. *Mariolaemus livens* (Grouvelle) **comb. n.**

Laemophloeus livens Grouvelle, 1923.

The length of the elytra distinguishes *M. eichelbaumi* and *M. livens* from the other two species of the genus ; however, the differences that Grouvelle gave to separate *M. livens* from *M. eichelbaumi* (the lesser convexity, the striole at the bases of the antennae and the sublateral impression on the pronotum) are characters difficult to appreciate in the absence of the type specimen(s) ; they have not been discernible in any specimen examined by me.

The type of this species has not been located nor have specimens been found to correspond with the original description. Grouvelle stated that it was related to *M. eichelbaumi* most closely and also to *M. misellus* and *M. escalerai*.

EAST AFRICA.

2. *Mariolaemus misellus* (Grouvelle) **comb. n.**

(Text-fig. 45)

Laemophloeus misellus Grouvelle, 1889.

1·7–2·0 mm. ; body black with a reddish tinge, tarsi yellow to red in colour.

Head transverse, 1·5 times as wide as long ; a short, shallow groove situated on anterior margin of impunctate area at base of antennae, antennae about as long as body ; surface evenly punctured (except for area at base of antennae), punctures smaller in diameter than eye facets, separated by distance equal to two to five times their diameter ; each with a short seta about equal to three diameters in length ; surface between punctures with micro-punctures but otherwise smooth and shining.

Pronotum 1·5 times as broad as long, as broad as head, narrowing basally ; disc with punctures, setae and surface as on head.

Elytra slightly broader across shoulders than base of pronotum, broadest at about anterior third, as broad as pronotum at widest ; elytra 1·2 times as long as their combined width, each with punctured striae ; third cell developed internally and anteriorly ; each separately rounded to apico-sutural angle ; last segment of abdomen exposed dorsally.

There are 2 syntypes in the Grouvelle collection ; I select a specimen with the following data as lectotype (it appears to be the specimen figured in the original description) : " Assinie Côte occid. Afrique Ch. Alluaud 1886/Type/*Laemophloeus misellus* Grouv." The paralectotype, which is the same species as the lectotype, bears the following data ; " Assinie Afrique oc [printed on green paper]/Type [black printed on white]/Laemophloeus misellus Grouv [mss]/Type [black printed on red]."

This species is one of the commonest of the African Laemophloeinae not associated with stored products, and is widespread in its distribution. I have seen specimens from Abyssinia, the Ivory Coast, the Congo, Uganda, Angola and South Africa.

3. ***Mariolaemus escalerai*** (Grouvelle)[1] **emend. comb. n.**

Laemophloeus escalerae Grouvelle, 1905.
Laemophloeus subniger Grouvelle, 1905, **syn. n.**

This species resembles *M. misellus* (Grouvelle) very closely but differs as follows : *head* and *pronotum* with very few if any micropunctures between punctures ; *pronotum* slightly broader than head ; *elytra* across shoulders as broad as greatest breadth of pronotum, at anterior third distinctly broader ; elytra evenly rounded together apically.

There are 3 syntypes of *M. escalarai* (Grouvelle) in the Grouvelle collection. I select a specimen with the data)" Biaffra Escalera " as lectotype. The other two syntypes, which are mounted together, bear the data ; " Biafra Cabo S. Juan VII–1901 Escalera/Type [mss]/*L. Escalerae* Grouv. ty. [Grouvelle's mss] " and a Paris museum type label. They are conspecific with the lectotype. The holotype of *L. subniger* Grouvelle, whose data are " Assinie Côte occid. Afrique Ch. Alluaud 1886/*L. subniger* Gr. ty ined.", is the same species as *M. escalerai*.

CONGO, WEST AFRICA.

The following specimens have also been seen : 2 " Stanleyville : Yangambi 1/16–xii–1953. J. Decelle " ; 1 " Haut-Uele : Moto vi/vii–1923 L. Burgeon " ; 1 " Coquihatville, 100 km en amout de, sur le fleure à la lumière 3–v–1949. N. Leleup "; 1 " Yangambi 20–ix–1952 Dr. K. Schedl " ; 1 " Congo Belge Leopoldville L. Burgeon 1917 " ; 3 "Ogoone Lambarene R. Ellenberger 1911 " (Mus. R. Congo Belge) ; 2 " Yaule/Nimba (Guinee) M. Lamotte 2–vi–1942 " (Muséum National d'Histoire Naturelle, Paris).

4. ***Mariolaemus eichelbaumi*** (Grouvelle) **comb. n.**

Laemophloeus eichelbaumi Grouvelle, 1908.

This species resembles both *M. misellus* and *M. escalerai* but differs in having no groove or stria anterior to the impunctate region at the base of the antennae and in the elytra being more than 1·5 times as long as their combined width ; it resembles *M. misellus* in having each elytron separately rounded to the apico-sutural angle and *M. escalerai* in the non-exposure of the last tergite of the abdomen.

EAST AFRICA, CONGO.

There are 8 syntypes in the Grouvelle collection ; I select the one with the following data as lectotype : " Af. or. all. Amani/19/*Laemophloeus eichelbaumi* inéd. Grouv." All the other syntypes bear the following data : " Afr. or. all Amani ", and two additionally : " Eichelbaum " on a separate label.

Grouvelle describes this species as being common at Amani during the months of July to November. Two specimens have been examined other than the syntypes, both from the Belgian Congo. One (British Museum (Natural History)), bears the following data: " 18 m. S.W. of Elizabethville 1928 Dr. H. S. Evans " ; the other (Mus. R. Congo Belge), " Elizabethville—ii–1940 H. J. Bredo ".

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[1] The emendation accords with the provisions of Article 31 of the International Code of Zoological Nomenclature, 1961.

XIII. *NOTOLAEMUS* Lefkovitch

Notolaemus Lefkovitch, 1959*b*.

Type species : *Cucujus unifasciatus* Latreille (by original designation).

2–3 mm.; body moderately flattened.

Head somewhat wider than long ; eyes moderately prominent, situated in advance of base and occupying less than one half of lateral margin of head ; front margin of head with a central labral, paired mandibular and often small antennal emarginations ; antennae about equal in length in both sexes, approaching length of body ; last three segments not forming a distinct club ; lateral line represented by raised ridge ; a subsidiary ridge behind eye present in addition.

Pronotum transverse, narrowed basally ; anterior and posterior angles moderately prominent lateral margin sometimes irregularly rounded ; lateral line represented by raised ridge which is somewhat broadened basally.

Scutellum triangular ; *elytra* often leaving the tip of abdomen exposed dorsally ; the three cells present or absent ; outer margin of third cell when present may or may not coincide with lateral carina.

Genae normal ; *gular* sutures distinct ; anterior *coxal cavities* widely open posteriorly ; coxae globular ; prosternal intercoxal process slightly convex posteriorly ; *metepimera* not contributing to mesocoxal cavities ; posterior border of *mesosternum* very slightly convex posteriorly ; *metasternum* about as long as first two abdominal sternites, median line broadening towards anterior margin ; intercoxal process of first visible abdominal sternite slightly curved anteriorly ; this sternite twice as long as second, second to fifth sterites subequal ; trochantero-femoral junctions of normal type although approaching heteromeroid type in middle and hind legs ; legs subequal in length, middle femora slightly less dilated than front or hind ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

Key to African Species

1. Pronotum with two well separated lateral lines on each side . . . 1. **perrieri** (Grouvelle) (p. 221)
– Pronotum with one lateral line on each side 2
2. Mandibles of the male broadly produced laterally (Text-fig. 48) . 2. **elli** sp. n. (p. 221)
– Mandibles not produced laterally but rounded 3
3. Hind angles of the pronotum acute or rectangular 4
– Hind angles of the pronotum obtuse 5
4. Pronotum with a short, longitudinal deep impression on each side external to the lateral carina and adjacent to it at its mid-point (Text-fig. 49) . . . 3. **perspicuus** (Grouvelle) (p. 222)
– Pronotum with a transverse, impressed line between the lateral carina and the lateral margin at its mid-point (Text-fig. 50) . . . . . 4. **riartus** sp. n. (p. 223)
5. Pronotum excavate sublaterally (Text-fig. 51) ; body brown 5. **clarus** (Grouvelle) (p. 223)
– Pronotum flattened sublaterally (Text-fig. 52) ; body brown or black 6
6. Body black and rather dull . . . . . . 8. **picinus** (Grouvelle) (p. 226)
– Body brown and rather shining 7
7. Head with a deep transverse groove on each side at the bases of the antennae ; body 2·5 mm. in length or more . . . . . . 6. **peringueyi** (Grouvelle) (p. 224)
– Head at most with a shallow fovea on each side at the bases of the antennae, usually non-foveate and flat ; body rarely longer than 2·3 mm., usually 2·0 mm. or less in length . . . . 7. **liganus** sp. n. (p. 225)

1. *Notolaemus perrieri* (Grouvelle) **comb. n.**

Laemophloeus perrieri Grouvelle, 1906.

This species differs from other *Notolaemus* in possessing two lateral lines on each side on the head and pronotum, and in the broadness of the head.

2 mm.; brown in colour; head and pronotum covered with short, fine setae; punctures almost invisible.

Head transverse, broader across eyes than pronotum at widest, with two lateral lines on each side; eyes one diameter in advance of base; antennae about as long as body.

Pronotum 1·3 times as broad as long, broadest just behind anterior angles; two lateral lines on each side, distance between inner and outer equal to that between outer and lateral margin; anterior angles acute, posterior angles obtuse.

Elytra 1·5 times as long as their combined width, evenly rounded to apico-sutural angle.

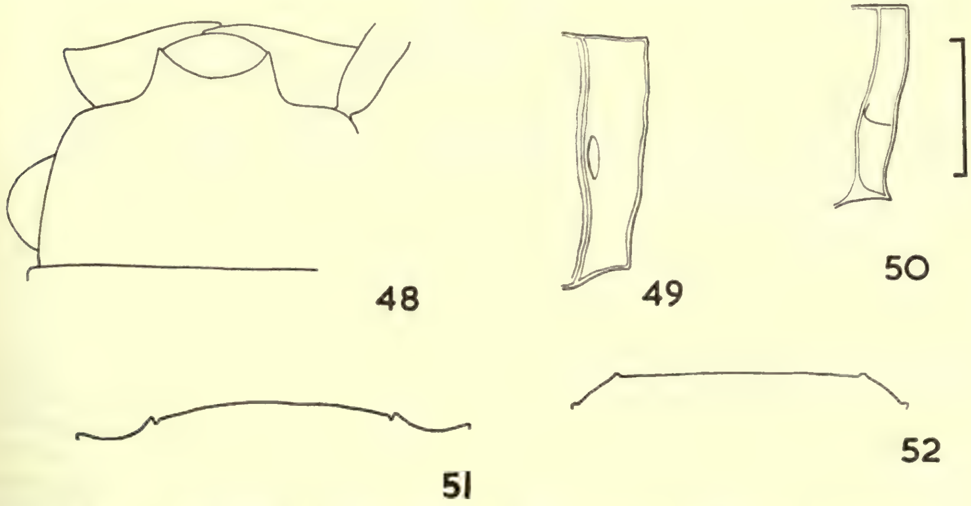
Female unknown.

HOLOTYPE male "Madagascar/Perrier/Type/*Laemophloeus perrieri* Grouv." (Grouvelle collection). A second male, with the following data, has been seen: "Zamscolla ix–1952 R.P. Institut Scientifique Madagascar" (Muséum National d'Histoire Naturelle, Paris).

2. *Notolaemus elli* **sp. n.**

(Text-fig. 48)

This species is distinct from other *Notolaemus* in that the mandibles of the male are strongly produced laterally and the external angles of the central epistomal



FIGS. 48–52. (48) Head of *Notolaemus elli*; (49) sublateral region of pronotum of *N. perspicuus* and (50) of *N. riartus*; (51) transverse section of pronotum of *N. clarus* and (52) of *N. peringueyi*.

Scale line = 0·25 mm.

emargination are produced anteriorly, recalling the condition in *Planolestes*; however, the characters included in the key to genera serve to distinguish this species from those of that genus.

2·1–2·5 mm.; head and pronotum dark red, elytra more yellow in colour.

Head widest across eyes, broader than pronotum; labral emargination of epistome with external angle somewhat produced anteriorly, recalling those of a small male *Planolestes*; antennae as long as body in *males*, shorter in *females*; surface of disc punctured, punctures small, circular and separated by once to three times their diameter, each subtending a seta; mandibles of *males* often strongly produced laterally resembling a claw-hammer in general appearance.

Pronotum broader anteriorly than posteriorly in *males*, about same width in *females*; surface with puncturation and setae as on head.

Elytra evenly rounded to apico-sutural angles.

CONGO.

HOLOTYPE male " Maceo (Luebo) 23–ix–1921 Dr. H. Schouteden "; paratypes: 1 with the same data as the holotype (female); 4 " Kamalembi (Luebo) 21–ix–1921 Dr. H. Schouteden " (2 males and 2 females) (Mus. R. Congo Belge).

3. ***Notolaemus perspicuus*** (Grouvelle) **comb. n.**

(Text-fig. 49)

Laemophloeus perspicuus Grouvelle, 1899.

This species is most closely related to *N. elli* sp. n. but can be distinguished from it in that the mandibles of the male are not produced laterally and that the production of the external angles of the median epistomal emargination is much less.

2·0–2·5 mm.; shining; head and pronotum reddish brown in colour, elytra yellower.

Head in *males* about as broad as pronotum, somewhat narrower in *females*; epistome with outer pair of emarginations not developed; outer margins of the central emargination somewhat produced anteriorly; antennae in *males* about three-quarters length of body, in *females* about half length of body; surface of head with small, circular punctures separated by once to three times their diameter, this surface smooth.

Pronotum broadest between anterior angles in *males*, somewhat behind them in *females*; anterior angles obtuse and rounded, posterior angles rectangular or just acute and sharp; puncturation and setation as on head.

Elytra about 1·75 times as long as their combined width.

RHODESIA, CONGO, SOUTH AFRICA.

There are 4 syntypes in the Grouvelle collection: I select as lectotype a male " C. B. Esp. Peringuey/Type/*Laemophloeus perspicuus* Grouv. ty ". The three other syntypes have the following data: two " C. B. Esp "; one " C. B .Esp./Type [black printed on white]/104 ". Other specimens seen include 2 " Kunungi 9–iv–1921 Dr. H. Schouteden "; 2 " Ubangi 1–ii–1931 M. Leontovitch "; 1 " Arebi vii–1925 Dr. H. Schouteden "; 1 (female) " Haut-Uele: Adra 23–iv–1925 Dr. H. Schouteden " (Mus. R. Congo Belge); 3 " N.W. Rhodesia Shigariatombwes, 30–vi–1913 H. C. Dollman " (British Museum (Natural History)).

4. ***Notolaemus riartus* sp. n.**

(Text-fig. 50)

Closest to *N. perspicuus* (Grouvelle) with which it could easily be confused. In addition to the transverse line between the lateral carina and lateral margin, *N. riartus* is a dirty yellow in colour rather than reddish brown, is less convex than *N. perspicuus* and has the sides of pronotum more smoothly rounded.

1·8–2·3 mm.; moderately shining ; body fuscous yellow in colour, elytra almost transparent.

Head in *males* as broad as or broader than pronotum, somewhat narrower in *females* ; epistome with outer pair of emarginations weakly developed, outer margins of the labral emargination somewhat produced anteriorly ; antennae almost as long as body in *males*, shorter in *females* ; surface of head punctured, surface micro-reticulate between them.

Pronotum broadest behind anterior angles in both sexes ; anterior angles obtuse and rounded, posterior angles slightly acute and moderately sharp ; surface ornamented as on head.

Elytra 1·75–2·0 times as long as their combined width, sometimes leaving tip of abdomen exposed dorsally.

RHODESIA, CONGO, ANGOLA.

HOLOTYPE and 2 paratypes " Angola 4117.15—Alto Cuilo, Poste de Cacolo, gal. forest. missean Tcha-Muchito, 2–vi–54. A. de Barros Machado " ; other paratypes : 3 " Angola 4119.3 Alto Cuilo (Cacolo) vi–54. A. de Barros Machado " ; 1 " Angola 4072.6—Alto Cuilo, Poste de Catolo, rives de la Cavuemba, detr. sol. 26–v–54. A. de Barros Machado " ; 1 " Angola 4116.20 (as 4072.6) " ; 1 " N.W. Rhodesia Shigariatombwes 8–vii–1913 H. C. Dollman " (British Museum (Natural History)) ; 3 " Miss. H. de Saeger 3384 " (see Appendix) ; 2 " Ubangi 1–ii–1931 " ; 1 " Arebi vii–1925 Dr. H. Schouteden " (Mus. R. Congo Belge).

5. ***Notolaemus clarus* (Grouvelle) comb. n.**

(Text-fig. 51)

Laemophloeus clarus Grouvelle, 1899.

This species is closest to the European *N. castaneus* (Erichson). The two species differ in many ways and can be most easily distinguished in the region of the scutellum ; in *N. castaneus* the scutellum is darker in colour than the adjacent parts of the elytra, whereas in *N. clarus* it is lighter.

3 mm.; dark brown in colour ; surface somewhat dull.

Front of *head* with five emarginations ; slightly narrower across eyes than pronotum at its widest ; surface of head closely punctured, punctures circular, separated by one half of their diameter, surface between them with a fine micro-sculpture ; each puncture with a seta about equal to one to one and one half times their diameter in length ; antennae as long as body in *male* (*female* unknown).

Pronotum somewhat irregularly rounded laterally ; front angles acute, posterior angles obtuse ; sublateral region somewhat explanate ; puncturation, setation and micro-sculpture as on head.

Elytra twice as long as their combined width.

SOUTH AFRICA, EAST AFRICA.

HOLOTYPE " C.B. Esp. Perinta [= Peringuey?]/Type/103/*Laemophloeus clarus*

Grouv. ty." One other specimen has been seen, a male " Africa or. Katona/Kilimandjaro x–1904 " (Magyar Nemzeti Museum, Budapest (ex Reitter coll.)).

6. ***Notolaemus peringueyi*** (Grouvelle) **comb. n.**

(Text-fig. 52)

Laemophloeus peringueyi Grouvelle, 1899.

A very variable species. One of the most characteristic and constant features is the diagonal grooving of the disc of the head just anterior to the antennae. These grooves appear to be indicative of the frontoclypeal suture, but since the impressed median line ends anteriorly in advance of the median junction of these grooves, the latter cannot be considered to be homologous with those of *Placonotus*.

2·5–3·0 mm.; reddish brown in colour.

Head as broad across eyes as pronotum at widest ; antennae as long as body in the *male*, all segments elongate ; in *female*, antennae about three-quarters body length, segments less elongate and with last three segments forming a distinct club ; surface of head simply punctured, punctures separated by two to three times their diameter, each with a seta about two diameters in length ; surface between punctures with micro-reticulation.

Pronotum transverse, at its widest 1·3–1·6 times as wide as long, broadest just behind anterior angles, narrowing basally ; anterior angles acute and rounded, posterior obtuse but sharper ; surface ornamented as head.

Elytra twice as long as their combined width, evenly rounded apically, giving elytra a truncated elliptical shape.

Additional characters are given by Grouvelle in his original description of the species.

SOUTH AFRICA.

Grouvelle, in his original description, indicated that the syntypes of this species were in the Cape Museum and in his own collection. In the South African Museum, there is a single specimen (male) with the following data ; " CT 5.86/CT 9.86 Under bark/102 [black printed on white]/Laemophloeus Peringueyi Grouv. ty [Grouvelle's mss] ". In the Grouvelle collection, there are two specimens which I consider to be syntypes of this species, a male " C.B.Es. Raffray/Type [black printed on white]/ Laemophloeus Peringueyi Grouv ty." and a Paris museum type label, and a female " C.B. Esp. Peringuey/Type [black printed on white] 105 [black printed on white] " and a Paris museum type label. Another specimen in the Grouvelle collection which may be a syntype bears the data " C.B. Esp. Raffray " written with a different colour ink on differently coloured paper from the other Raffray specimen. There is yet another specimen of this species which should be mentioned, which although bearing a type label, is not a syntype of any properly described species. Its data are " Le Cap Chevrolet [sic]/Type [black printed on white]/Laemophloeus capensis Chevr [and an illegible word which might be D'tege] ". This species has never been validly published, so far as it has been possible to discover, and is not listed by Hetschko (1930). I now select the male belonging to the South African Museum to be lectotype.

I have examined the following specimens of the species : 24 " Port St. John Pondoland Sept. 1923/R. E. Turner " ; 1 " Natal ; Van Reenan, Drakensberg

55–6500 ft. x–1926/R. E. Turner " ; 1 " Natal : Kloof 1500 ft. Sept. 1926/R. E. Turner " ; 1 " E. Cope Prov. Hogsback 4000 ft. 10–x–1932/R. E. Turner " ; 4 " E. Cape Prov. Katberg 1/13–xi–1932/R. E. Turner " ; 3 " E. Cape Prov. Katberg 4000 ft 14/26–xi–1932/R. E. Turner " ; 2 " E. Cape Prov. Katberg 4000 ft. xii–1932/R. E. Turner " ; 6 " Zululand : Eshowe 1–22–iv–926/R. E. Turner " ; 1 " George, Cape Prov. 27–vi to 1–vii–1920/ R. E. Turner " 1 " Orange Free State : Witziesnoek. 6100 ft. 24–ii–1929/Dr. Hugh Scott " ; 1 "Estcourt, Natal. G. A. K. Marshall " ; 16 " Stn. No. 59, Deepwalls Forest. Knysna 16–iii–1954 under bark of Yellow-wood, 1725 ft. Cape Province J. Balfour-Browne, B.M. 1954–797 " ; 2, as previous 16 but dated 17.iii.1954 and " small pool in glade, 1725 ft." (British Museum (Natural History)).

7. ***Notolaemus liganus*** **sp. n.**

This species resembles *N. peringueyi* (Grouvelle) but differs in that it is smaller, is a dirty yellow in colour and does not have the diagonal grooving anteriorly on the head.

1·5–2·3 mm.; blackish yellow in colour, moderately shining.

Head slightly narrower across eyes than pronotum at broadest ; antennae almost as long as body in *males*, segments elongate, ninth segment slightly longer (*c.* 1·25 times) than tenth ; in *females*, terminal three segments slightly more thickened than third to eighth ; surface of head with punctures equal in diameter to an eye facet, separated usually by once but sometimes as much as twice times their diameter, each with a seta equal to two diameters in length ; surface between punctures smooth and shining.

Pronotum transverse, about 1·25 times as broad as long ; moderately convex, broadest at about anterior third ; anterior angles rectangular but not sharp, posterior angles obtuse ; surface ornamented as on head.

Elytra 2·0–2·2 times as long as their combined width, together evenly rounded apically, broadest at about mid-point.

CONGO, ANGOLA.

HOLOTYPE and 1 paratype " Miss. H. de Saeger 4007 " ; other paratypes 1 " Miss. H. de Saeger 3186 " ; 2 " Miss. H. de Saeger 3235 " ; 5 " Miss. H. de Saeger 3296 " ; 3 " Miss. H. de Saeger 3384 " ; 2 " Miss. H. de Saeger 3519 " (see Appendix) (Mus. R. Congo Belge) ; 1 " Angola 4076.1.5—Gal. forest. riv. Tcha-Pemba, affl. Luangue, Poste de Xa-Cassan, 26–v–54. A. de Barros Machado " ; 4 " Angola 4072.6–Alto Cuilo, Poste de Cacalo, rives de la Caouemba, detr. sol. 26–v–54. A. de Barros Machado " ; 2 " Angola 4116.20 (as for 4072.6) " ; 3 " Angola 4118.9—Gal. Forest. riv. Lunguena, affl. Luangue, Poste Xa-Cassan, 7–vi–54. A. de Barros Machado " ; 1 " Angola 4168.12 Alto Chicapot, dans les mousses d'une cascade, 24–vi–54. A. de Barros Machado " ; 1 " Angola 4276.16—Alto Chicapa, gal. forest ; riv. Tchirimbo, detr. sol. 9–vii–54. A. de Barros Machado " ; 1 " Angola 4125.35—Alto Cuilo, Cacolo, rives ruisseau Na-Ipanha, detr. sol. 10–vi–54. A. de Barros Machado " ; 1 " Angola 4370.36 Alto Chicapa, gal. for. riv. Tchimboma, detr. sol, 1–viii–54. A. de Barros Machado " ; 6 " Angola 4082.15 (as for 4072.6) " (British Museum (Natural History)).

8. ***Notolaemus picinus*** (Grouvelle) **comb. n.**

Laemophloeus picinus Grouvelle, 1923.

This is a very distinct species, being the only black one of its genus ; it most closely resembles the European *N. unifasciatus* (Latreille) in shape and general body proportions but differs in that it is black ; the punctures on the head are about twice the diameter of an eye facet and are situated close together.

N. picinus is the only species of the *unifasciatus* group known to occur in Africa, all the other species of the genus in Africa being closer to *N. castaneus* (Erichson).

EAST AFRICA, CONGO.

In addition to the holotype, which bears the data " AFR. OR ANG. (KIKUYU-ESCT) KIJABE Alluaud et Jeannel Dec. 1911–2100 m–St. 27 [printed]/Type [black printed on pink]/Laemophloeus picinus Grouv." and a Paris museum type label, I have seen the following specimens : 1 " Miss. H. de Saeger 3488 " ; 1 " Miss. H. de Saeger, 4007 " (see Appendix) (Mus. R. Congo Belge).

XIV. ***PLANOLESTES*** Lefkovitch

Planolestes Lefkovitch, 1958*a*.

Type species : *Planolestes laevicornis* Lefkovitch (by original designation).

In addition to the characters given in the original description, the following points should be noted : *head* with lateral line represented by raised ridge, median line by shallow groove ; *pronotum* with lateral line represented by a raised ridge ; at about middle third a deep groove just internal to ridge ; basally a short, raised secondary ridge internal to primary ridge ; lateral line appears to be a double structure in basal third, dividing into two very close to base, one part turning abruptly to meet hind angles, other continuing to base ; *gular* sutures obsolete ; anterior *coxal cavities* circular ; *prosternal process* convex posteriorly ; *mesepimeron* and *mesepisternum* contributing to the mesocoxal cavities ; posterior margin of the *mesosternum* straight ; median line of *metasternum* not quite reaching anterior margin of sclerite ; trochantero-femoral junctions of normal type.

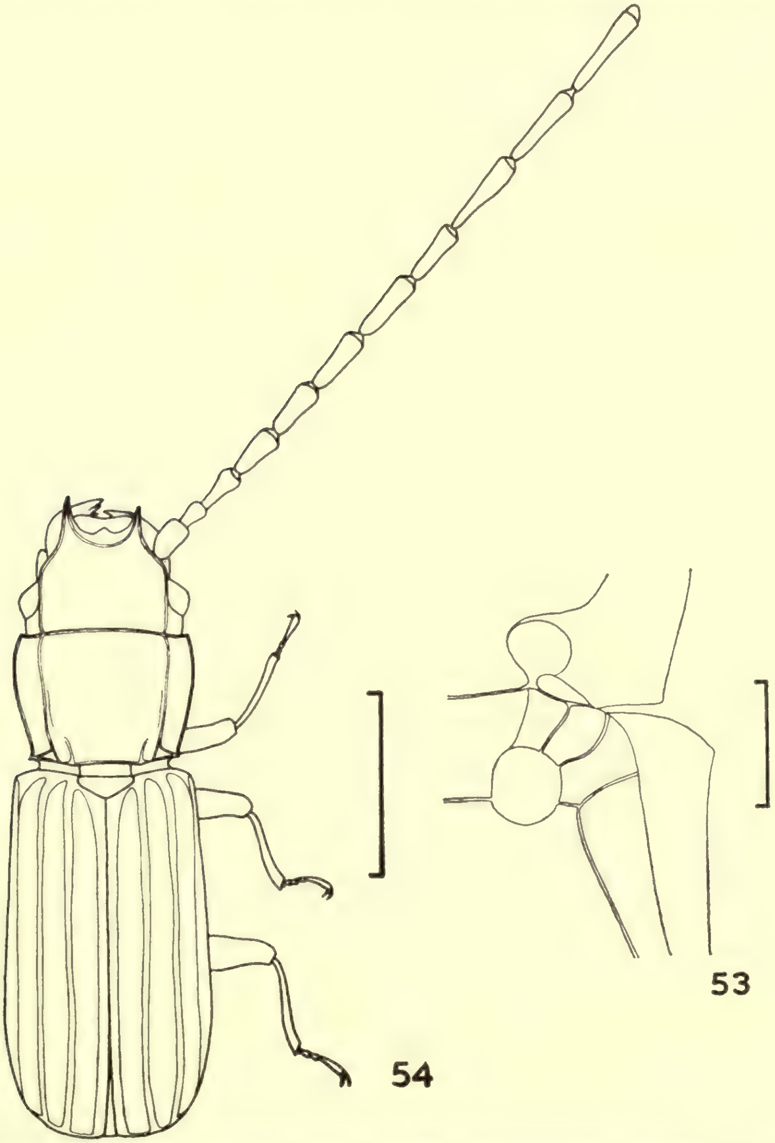
I am indebted to Mr. J. C. Davies for collecting larvae of *Planolestes* ; these have emphasized the generic separation of *Planolestes* from *Cryptolestes*. A full study of these and other Cucujid larvae will be published elsewhere.

No redescriptions of the species belonging to this genus will be given.

KEY TO SPECIES

1. Prothorax 1·5 times as broad as long ; head of male with clypeal horn strongly developed on the left side only, vestigial on the right **laevicornis** Lefkovitch (p. 228)
– Prothorax less than 1·5 times as wide as long, rarely exceeding 1·3 times ; head of male with clypeal horns strongly developed on both sides 2,
2. Head coarsely punctured near the median line, punctures longitudinally elongate, separated by about one diameter ; thoracic punctures as those on the head ; setae on disc of thorax about equal in length to that of the punctures . . **brunneus** (Grouvelle) (p. 228)
– Head with very few punctures near the median line, those present being circular, two to four diameters apart ; thoracic punctures as those on the head ; no apparent setae on the disc of the thorax . . . . **cornutus** (Grouvelle) (p. 228)

Four species were considered by Lefkovitch (1958*a*) to belong to this genus. The placing of one of these, described originally as *Laemophloeus biskrensis* Grouvelle was based upon a specimen labelled " type " in the Grouvelle collection. It has since been compared with the true type in the Alluaud collection and found not to be conspecific. In fact *L. biskrensis* is a *Cryptolestes* and is considered in this paper under that genus (p. 233). The incorrectly named specimen in the Grouvelle collec-



FIGS. 53–54. (53) Front and middle coxal cavities of *Planolestes cornutus* ; (54) dorsal view of male *P. cornutus*.
Scale lines : Fig. 53 = 0·25 mm. ; Fig. 54 = 1 mm.

tion has proved to be a rather aberrent *Planolestes cornutus* (Grouvelle), agreeing reasonably with the original description of the species with which it had been confused.

Planolestes laevicornis Lefkovitch

Planolestes laevicornis Lefkovitch, 1958*a*.

South Africa.

No specimens additional to the type and paratypes have been located.

Holotype and 3 paratypes " Fort Beaufort. C[ape] P[rovince] June 1941. J. W. Geyer. With scale *Lecaniodiaspis mimosae* [(Maskell)] " ; other paratypes as follows : 4 " Grahamstown C[ape] P[rovince.] June 1908. C. W. Mally. Emerged from Mimosa thorn twig " ; 3 " Okahandja 19–29–xii–1927. S.W. Africa. R. E Turner " (British Museum (Natural History)).

Planolestes brunneus (Grouvelle)

Laemophloeus brunneus Grouvelle, 1877.

Congo, East Africa.

Holotype " Zanzibar Raffray/Type [mss]/L. brunneus Grouv. ty " and a Paris museum type label.

Grouvelle (1908) expressed the opinion that this and the next species were synonymous. Lefkovitch (1958*a*) showed that they could be distinguished by the female genitalia and that both sexes differed slightly externally. The following specimens, in additon to the type (which bears no data) have been seen : 1 " Dimbrey C.B. Esp." in the Grouvelle collection ; 1 " Bushurn iii–1937 J. Ghesquière ", 7 " Mongbwalu –vii–1938 Mme. Scheitz " (Mus. R. Congo Belge).

Planolestes cornutus (Grouvelle)

(Text-fig. 54)

Laemophloeus cornutus Grouvelle, 1899.

This species was described from a single male from Madagascar. The species appears to be widespread ; I have seen specimens from Madagascar, from various parts of the Congo, Ghana, Angola, Uganda, Nigeria, Bechuanaland, Cape Province, Pondoland, Southern Rhodesia, Kenya.

There is a quite definite association with legume pods. Both Mr. F. Ashman of the Department of Agriculture, Kenya, and Mr. J. C. Davies of the Department of Agriculture, Uganda, formed the opinion that this species, which they sent to me for identification, was attacking legume pods.

XV. ***CUCUJINUS*** Arrow

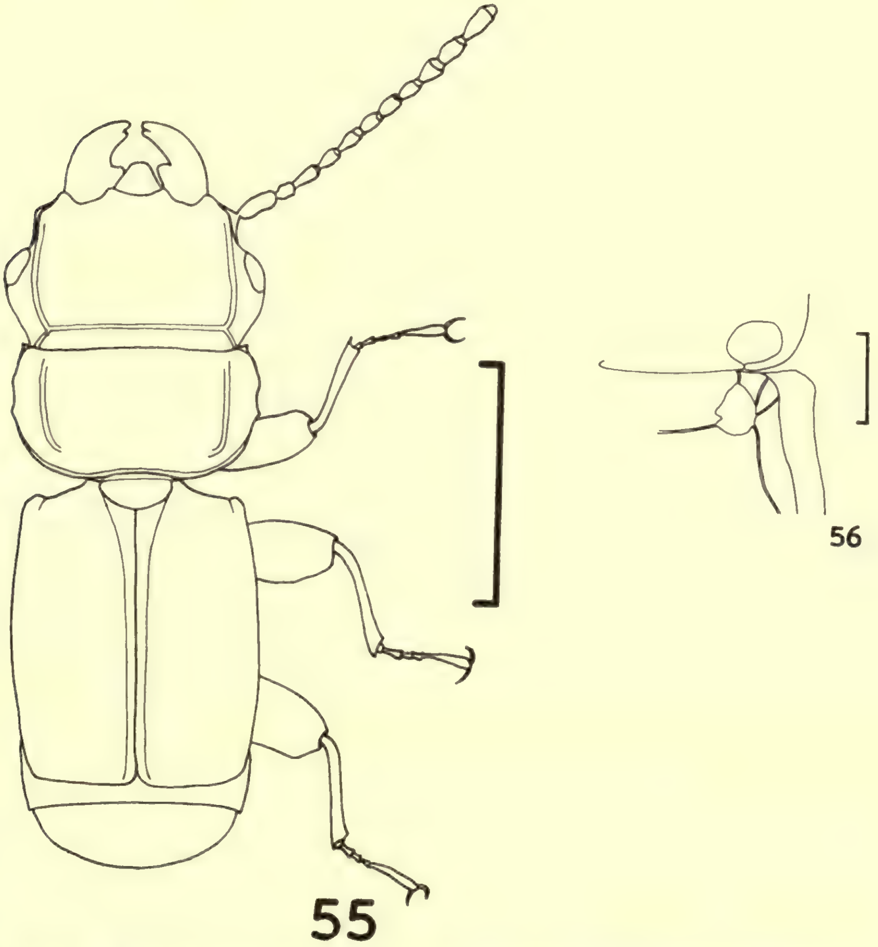
Cucujinus Arrow, 1920.

Type species : *Cucujinus micromma* Arrow (by monotypy).

This genus is being revised by Mr. W. O. Steel and therefore I include only a generic redescription designed to show its relationship with other African Laemophloeinae.

Head transverse, with distinct rounded temples, expanding from base; eyes about or more than one diameter in advance of base; frontoclypeal suture obsolete; front of head between antennae with five emarginations, a shallow labral, paired deep mandibular and a shallow pair between the mandibular and insertions of antennae; antennae about half body length, with a robust scape, small pedicel, slightly elongate third segment, segments increasing in size from fourth to terminal, last three or four segments giving the impression of forming a club but in fact not so; lateral line represented by a distinct groove, these grooves not joined anteriorly but basally; basally at junction of lateral and transverse grooves a diagonal groove running from junction to base.

Pronotum very transverse, usually more than twice as broad as long; anterior angles distinct and acute, hind angles rounded; lateral margin somewhat irregular; lateral line represented by a distinct groove which does not reach anterior margin, basally curved medially but does not continue across to join the other.



FIGS. 55–56. *Cucujinus* (55) dorsal view; (56) front and middle coxal cavities. Scale lines: Fig. 55 = 2 mm.; Fig. 56 = 0·25 mm.

Scutellum semicircular ; *elytra* leaving at least last abdominal segment and often one or two more exposed dorsally ; each elytron subtruncate, each separately rounded to apico-sutural angle ; *elytra* not carinate laterally and with only a sutural line distinct, other regions of cells obsolescent or obsolete.

Genae normal ; *gular* sutures distinct ; anterior *coxae* spherical, their cavities closed posteriorly, closure dorsal in relation to rest of cavity ; coxae very widely separated ; intercoxal process of prosternum slightly concave posteriorly ; mesocoxal cavities of rather irregular shape, not circular ; *mesepimeron* and *metepimeron* contributing to mesocoxal cavity ; hind margin of *mesosternum* convex posteriorly ; suture between *metasternum* and *metepisternum* curving outwards posteriorly, not straight ; median line of metasternum not reaching anterior margin ; *metasternum* about as long as first three abdominal sternites combined ; intercoxal process of first abdominal sternite very slightly convex anteriorly, this sternite twice as long as second, second to fourth subequal, fifth about as long as the first ; trochantero-femoral junctions of normal type ; legs subequal ; femora flattened and dilated in one plane ; tarsal formula 5–5–5 in *female*, either 5–5–4 or rarely 5–5–5 in *male*.

A species described from Madagascar probably belongs to this genus but differs from *Cucujinus s. s.* especially in the structure of the prothorax. This species, for which I propose the subgenus *Paracucujinus* **subgen. n.,** was described as *Laemophloeus brevipennis* Grouvelle. Since only the type has been seen and since *L. coquereli* Grouvelle from Réunion and one other undescribed species from that island are all the specimens I have seen belonging to this subgenus, a full study must wait until further material from these islands is available. The following key will serve to indicate the principal differences between the two subgenera.

KEY TO SUBGENERA OF *Cucujinus* ARROW

1. Front of head with the outer emargination on each side shallower than the adjacent ; labrum almost triangular in shape ; antennae with terminal segments much thicker than the intermediate ; pronotum with rounded anterior and obsolete posterior angles ; scutellum rounded posteriorly . . . . ***CUCUJINUS*** Arrow, *s. s.*

– Front of head with the outer emargination on each side deeper than the adjacent ; labrum almost semicircular in shape ; antennae with the terminal segments hardly, if at all, thicker than the intermediate, pronotum with acute, somewhat denticulate anterior angles and sharp, obtuse posterior angles ; scutellum angled posteriorly ***PARACUCUJINUS*** subgen. n.

The type species of *Paracucujinus* is *Laemophloeus brevipennis* Grouvelle, 1906. The following key will separate the two described species belonging to the new subgenus, each species of which is known only from the type specimen.

KEY TO SPECIES OF *Paracucujinus* **subgen. n**

1. Eyes situated twice their diameter in advance of the posterior angles of the head ***coquereli*** (Grouvelle) **comb. n.**

– Eyes situated their diameter in advance of the posterior angles of the head ***brevipennis*** (Grouvelle), **comb. n.**

Of previously described species hitherto incorrectly placed, *Laemophloeus curtipennis* Grouvelle and *L. nebulosus* Grouvelle properly belong to *Cucujinus s.s.* and are now placed in that genus **comb. n.**

XVI. *CRYPTOLESTES* Ganglbauer

Leptus Thomson, 1863, *nec* Latreille, 1796, *nec* Duftschmid, 1825.
Cryptolestes Ganglbauer, 1899.
Fractophloeus Kessel, 1921.

Type species : *Cucujus ferrugineus* Stephens (selected by Casey, 1916).

This comparatively large genus includes some species of economic importance and of wide distribution in the world.

1·5–2·5 mm.; body moderately flattened.

Head about as broad as long ; eyes of moderate size and situated in advance of base ; epistome slightly convex, straight or slightly concave anteriorly ; antennae when about half body length, distinctly clubbed, when about as long as body (*males* of some species) not distinctly clubbed ; lateral line represented by a ridge.

Pronotum very slightly to distinctly transverse, rarely exceeding 1·5 times, usually somewhat narrowed basally ; anterior angles distinct and usually obtuse ; posterior angles obtuse to acute, usually obtuse, sometimes obsolescent ; lateral line represented by a raised ridge and a closely approximated internal shallow groove.

Scutellum flatly triangular, approximating to pentagonal in shape ; *elytra* with the three cells developed, secondary intervals being quite narrow ; rows of punctures additional to striae may be present in cells.

Genae normal ; *gular* sutures obsolescent ; anterior *coxal cavities* closed behind ; anterior coxae spherical ; intercoxal process of prosternum straight or very slightly concave posteriorly ; *metepimeron* just not contributing to mesocoxal cavity ; hind margin of *mesosternum* straight ; *metasternum* almost as long as first two abdominal sternites combined, median line obsolete anteriorly ; first visible abdominal sternite twice as long as second, second to fourth subequal, fifth somewhat longer ; trochantero-femoral junctions of normal type (front and middle femora grooved ventrally for the reception of the tibiae) ; tarsal formula 5–5–5 in *female*, 5–5–4 in *male*.

A discussion of the problems in correctly identifying some species of this genus is given by Lefkovitch (1959*b*). Briefly, the adults show heterogony to such a subtle but confusing degree that detailed external description is almost valueless. The crucial points required for the identification of the species when using external characters alone are given in the key. As will be seen, no attempt is made to separate those species referred to as the " *pusilloides* " group, since it was found that constant external characters did not exist. Consequently, identifications of this group of species must be made by examination of the genitalia.

Key to African Species Based on External Characters

1. Body black in colour 2
– Body brown in colour 6
2. Scape of male equal in length to segments two to four combined and toothed dorsally apically . . . . 8. **planulatus** (Grouvelle) (p. 236)
– Scape of male much shorter than segments two to four combined and without any dorsal teeth 3
3. Hind angles of the pronotum obsolescent (Text-fig. 57) . 1. **spartii** (Curtis) (p. 232)
– Hind angles of the pronotum well developed (Text-fig. 58) 4
4. Body more than 2·1 mm. in length, well covered with setae ; males with antennae hardly longer than those of the female, reaching the basal third of the elytra 6. **lepesmei** (Villiers) (p. 236)

– Body 2 mm. or less in length, with or without setae ; males with antennae much longer than those of the female, nearly as long as body 5
5. Body shining, only sparsely covered with setae . . . 10. ***atulus*** sp. n. (p. 238)
– Body rather dull, thickly covered with setae . . . . 11. ***atuloides*** sp. n. (p. 238)
6. Antennae of males considerably longer than those of the females, often reaching to the apices of the elytra or beyond . . . " ***pusilloides*** " group (pp. 236–240)
7. ***pusilloides*** (Steel & Howe), 9. ***turcicus*** (Grouv.), 12. ***pusillus*** (Schön.), 13. ***ugandae*** Steel & Howe, 14. ***evansi*** sp. n., 15. ***minimus*** sp. n.
– Antennae of males hardly longer than those of the females, reaching to about the basal third of the elytra 7
7. Mandibles of male without tooth on their external margin ; elytra nearly twice as long as head and prothorax combined 8
– Mandibles of male with a tooth on their external margin ; elytra about 1·5 times as long as head and prothorax combined 9
8. Antennal segments hardly longer than broad, last three segments cylindrical 3. ***brunneus*** sp. n. (p. 234)
– Antennal segments at least twice as long as broad, last three segments flattened 2. ***biskrensis*** (Grouvelle) (p. 233)
9. Hind angles of pronotum obsolescent . . . . 5. ***capensis*** (Waltl) (p. 235)
– Hind angles of pronotum distinct . . . 4. ***ferrugineus*** (Stephens) (p. 234)

1. ***Cryptolestes spartii*** (Curtis)

(Text-figs. 59, 60)

Cucujus ater Olivier, 1795, *nec* Fourcroy, 1785.
Cucujus piceus Stephens, 1831, *nec* Olivier, 1795.
Cucujus spartii Curtis, 1834.
Laemophloeus rufipes Lucas, 1849.
Laemophloeus suffusus Wollaston, 1871, **syn. n.**

So far as at present known, this species is confined to Mediterranean Africa, Madeira and Europe ; it is included in this study since it seems likely to be recorded in the future.

1·8–2·5 mm.; antennae, mouthparts and legs brownish red in colour, remainder of body black ; setae yellowish in colour ; in very immature specimens adults entirely brownish red in colour and completely indistinguishable morphologically from *C. capensis* (Waltl).

Head in *males* often as broad as or broader than prothorax, truncated triangular in shape, narrower in some *males* and in all *females* ; eyes situated in advance of base ; median line present basally as an impression ; epistome very slightly concave anteriorly ; antennae reaching to just beyond base of elytra in both sexes ; mandibles of *males* with a tooth on outer margin ; surface evenly punctured, punctures about as large as an eye facet, separated by about one to three diameters, each with a short seta about two diameters in length ; surface between punctures smooth and shining at vertex, polygonally reticulate elsewhere.

Pronotum very slightly transverse, strongly narrowed basally, narrower than head in some *males* but usually broader ; anterior angles slightly acute in broad-headed males, otherwise obtuse ; hind angles obsolescent or very obtuse, often indistinguishable from slightly denticulate lateral margin of prothorax ; surface as on head.

Elytra about 2·25 times as long as their combined width ; the three cells developed, secondary intervals less than half as broad as cells ; each cell with one row of punctures additional to striae ; surface with longitudinal reticulation.

NORTH AFRICA, MADEIRA.

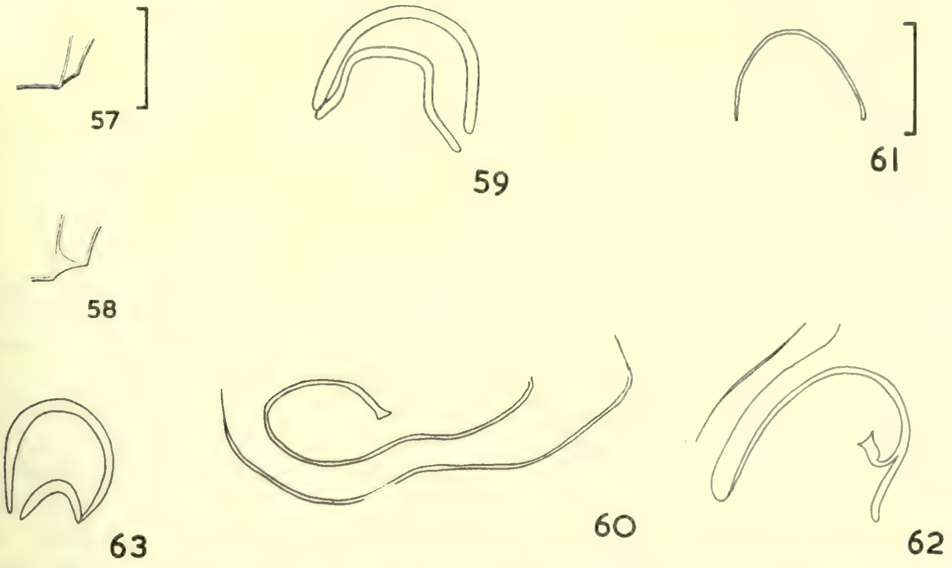
For a discussion of the synonymy of this species, see Lefkovitch (1959*b*). It is now possible to add *Laemophloeus rufipes* Lucas to this synonymy. There are two syntypes in the Lucas collection. An examination of these has enabled me to confirm Grouvelle's placing of this species (Grouvelle, 1874). In the last drawer of the Wollaston Madeira collection in the British Museum (Natural History), there is a single specimen agreeing with Wollaston's description of *L. suffusus*, which was based on a single individual collected by Bewicke. The data of this specimen, which I accept as the holotype of *L. suffusus*, are as follows : on the lower side of the card on which the specimen is mounted " Bewicke ", an independent label " *Laemophloeus suffusus*, Woll." in Wollaston's handwriting. It is quite clearly the same species as *C. spartii* (Curtis).

2. ***Cryptolestes biskrensis*** (Grouvelle) **comb. n.**

(Text-figs. 61, 62)

Laemophloeus biskrensis Grouvelle, 1899.

This large *Cryptolestes* (2–3 mm.) resembles *C. pusilloides* in its thoracic shape and in the length of the elytra but differs in several other important features. The head is rather foreshortened anterior to the antennal insertions and the truncate epistome is shorter in proportion than in *pusilloides*. There is a strong sexual dimorphism in the antennae, mainly connected with the fourth to the seventh and ninth to eleventh segments of the antennae which in males increase in length with hardly if any increase in width and the distal segment is about four times as long as broad ; the last three segments in the *female* are distinctly broader than those preceding. In their total length the antennae of the male reach to about the basal third of the elytra ; those of the female are a little shorter.



Figs. 57–63. *Cryptolestes*. (57) Hind angle of pronotum of *C. spartii* and *C. capensis* ; (58) of *C. lepesmei* and *C. ferrugineus* ; (59) sclerites associated with male genitalia of *C. spartii* and *C. capensis* ; (61) of *C. biskrensis* (63) of *C. brunneus* ; (60) sclerotization on wall of bursa copulatrix of *C. spartii* and *C. capensis* ; (62) of *C. biskrensis*.
Scale lines : Figs. 57, 58 = 0·25 mm. ; Figs. 59–63 = 0·1 mm.

This species occurs north of the Sahara and in Central Africa. It was not possible to discover any difference in the specimens from the two localities in spite of the improbability of their being conspecific.

NORTH AFRICA, UGANDA, CONGO.

I have examined the following specimens : northern form : 1 " Algerie Chellala " ; 1 " Environs de Biskra De Vauloger " ; 3 " Moyen Chari/Fort Archambault/Bongoul (Ba-Kare)/Mission Chari-Tchad/Dr. J. Decorse 1904 Mai ent April " 1 " Biskra Vauloger " ; 1 " Franchetti/Algerie " (Muséum National d'Histoire Naturelle, Paris) ; southern form : 1 " Uganda Katona/Mujenje ix–1913 " ; 9 " Miss. H. de Saeger 63, 578 1803, 1157, 2172, 3012, 3519, 3567, 4057 " (see Appendix) (Mus. R. Congo Belge).

3. *Cryptolestes brunneus* sp. n.

(Text-fig. 63)

1·8–2·5 mm. Resembling *C. biskrensis* but distinguished easily by its darker colour, being a blackish brown, and its almost quadrate prothorax, and the antennal segments which are hardly longer than broad.

CONGO.

HOLOTYPE and 1 paratype (males) " Miss. H. de Saeger, 3341 " (see Appendix) (Mus. R. Congo Belge).

4. *Cryptolestes ferrugineus* (Stephens)

(Text-figs. 64, 65, 66).

Cucujus testaceus Paykull, 1799, *nec* Fabricius, 1787.
Cucujus ferrugineus Stephens, 1831.
Cucujus monilicornis Stephens, 1831.
Laemophloeus concolor Smith, 1851.
Laemophloeus obsoletus Smith, 1851.
Laemophloeus carinulatus Wollaston, 1877, **syn. n.**
Laemophloeus emgei Reitter, 1887.
Laemophloeus alluaudi Grouvelle, 1906, **syn. n.**

This species resembles *C. spartii* (Curtis) very closely, differing externally in that the body is brown in colour, in the hind angles of the pronotum being strongly developed, in the elytra possessing two rows of punctures in each cell in addition to the striae and in the epistome being very slightly convex.

The holotype of *Laemophloeus alluaudi* Grouvelle in the Alluaud collection has been examined and found to belong to this species. It is somewhat more pubescent than is typical of the species but not unusually so. There are five specimens of *Laemophloeus carinulatus* Wollaston in his collection from St. Helena in the British Museum (Natural History). One, a male, has the data " Laemophloeus carinulatus, type Woll." and a British Museum type label ; the others, which are females, have no data. Wollaston noted that he originally had seven specimens of the species ; I have been unable to locate the remaining pair. The five, which I consider to be syntypes, are the same species and I now select the male to be lectotype. I have no hesitation in synonymising this species with *C. ferrugineus*, of which Wollaston's specimens are normal examples ; Wollaston, commenting on his species, wrote that it was probably introduced into St. Helena.

C. ferrugineus is COSMOPOLITAN on stored foods and has also been found under bark, in soil and in most habitats where moderately dry plant material occurs. It can live entirely upon plant material but is facultatively predatory and cannibalistic.

5. *Cryptolestes capensis* (Waltl)

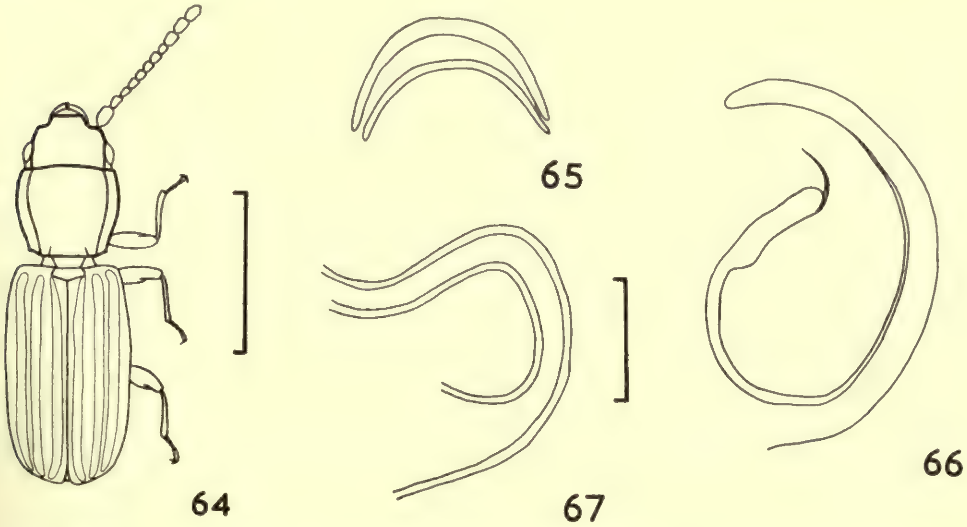
(Text-figs. 59, 60)

Cucujus capensis Waltl, 1834.
Laemophloeus elongatulus Lucas, 1849, **syn. n.**
Laemophloeus vermiculatus Wollaston, 1854, **syn. n.**
Laemophloeus clavicollis Wollaston, 1854, **syn. n.**

This species differs from *C. spartii* (Curtis) morphologically in one point only ; it is brown in colour in the mature adult and not black (see Lefkovitch, 1959*a* for a biological study of the relationship between these two species).

EUROPE, SOUTH AFRICA (associated with stored food).

Previously (Lefkovitch, 1959*b*), I stated that the specimens called *Laemophloeus elongatulus* Lucas that I had seen in European collections of Coleoptera were equally divided between large *C. ferrugineus* and *C. capensis*. Since then I have examined the fifteen syntypes. I select the specimen with a blue label and the words " *Laemophloeus elongatulus* Lucas " as lectotype. The species is morphologically identical with *C. capensis*.



FIGS. 64–67. *Cryptolestes*. (64) Dorsal view of *C. ferrugineus* ; (65) sclerites associated with male genitalia of *C. ferrugineus* ; (66) sclerotization on wall of bursa copulatrix of *C. ferrugineus* ; (67) of *C. lepesmei*.

Scale lines : Fig. 64 = 1 mm. ; Figs. 65–67 = 0·1 mm.

I have also examined the syntypes of *Laemophloeus clavicollis* Wollaston and *L. vermiculatus* Wollaston in the British Museum (Natural History) collection and found them to be identical with *C. capensis*.

6. ***Cryptolestes lepesmei*** (Villiers) **comb. n.**

(Text-fig. 67)

Laemophloeus lepesmei Villiers, 1940.

This species resembles *C. spartii* very closely but differs externally in that the hind angles of the pronotum are as well developed as in *C. ferrugineus*. In size *C. lepesmei* is larger than *C. spartii*, varying between 2·1–2·7 mm.

In his original description, Villiers wrote that there was a type and six cotypes. On examining the specimens, I found that no type had been labelled as such nor was any indication given in the description of any particular specimen as type. In discussion, Mons. Villiers informed me that he had no particular specimen in mind to be holotype. I select a male as lectotype, but not that specimen illustrated by Villiers since it is distorted on the left side. None of the specimens bear data.

CAMEROONS, ETHIOPIA.

In addition to the 7 syntypes, I have recognized 3 specimens of this species in the British Museum (Natural History) collection. They bear the following data : " Under bark of decaying Mimosa. Abyssinia : Djem-Djem forest. Nearly 9,000 ft. 1–x–1926. Dr. H. Scott ".

7. ***Cryptolestes pusilloides*** (Steel & Howe)

(Text-figs. 68, 69)

Laemophloeus pusilloides Steel & Howe, 1952.

1·8–2·2 mm.; body reddish brown in colour, the elytra in immature specimens being somewhat paler than the rest of the body.

Head about as broad as or slightly narrower than pronotum, slightly transverse ; epistome very shallowly concave anteriorly ; antennae as long as body in *male*, reaching the basal third of elytra in *female* ; surface punctured, punctures equal in diameter to facet of eye, separated by one to three times this distance, each with a seta equal to three to five times this diameter.

Pronotum transverse, about 1·1–1·2 times as broad as long, narrowing basally ; anterior angles obtuse and rounded, posterior rectangular and sharp ; puncturation and vestiture as on head.

Elytra hardly broader than pronotum, about twice as long as their combined width ; the three cells developed, each with one row of punctures in addition to two striae.

The geographical distribution of this species is discussed by Howe & Lefkovitch (1957). Briefly, *C. pusilloides* occurs in southern and eastern AFRICA, AUSTRALIA and SOUTH AMERICA and is associated with stored food.

8. ***Cryptolestes planulatus*** (Grouvelle) **comb. n.**

Laemophloeus planulatus Grouvelle, 1896.

This species resembles *C. pusilloides* in its general shape but differs as follows : *pronotum* somewhat more narrowed basally ; anterior and posterior angles acute ; scape in *male* equal in length to segments two, three and four combined, thickened distally, and dorsally produced into a tooth above the thickening. The scapes of Laemophloeinae are discussed by Lefkovitch (1958*b*).

CONGO.

HOLOTYPE female " 1. Bourbon Fairm./type/L. planulatus Grouv ty ".

Two colour forms exist, a brown (the typical form) and a black. The following specimens in addition to the holotype have been seen : black form : " Yangambi 1951 C. Donis z.1177/Com. Et. Bois Congo R.2394 " ; " Yangambi 1951 C. Donis z.306/Com. Et. Bois Congo R. 2326 " ; brown form : 28 " Miss. H. de Saeger, 928, 1214, 2007, 3186, 3384, 3519, 3649, 3738, 3744, 4007 " (see Appendix) (Mus. R. Congo Belge).

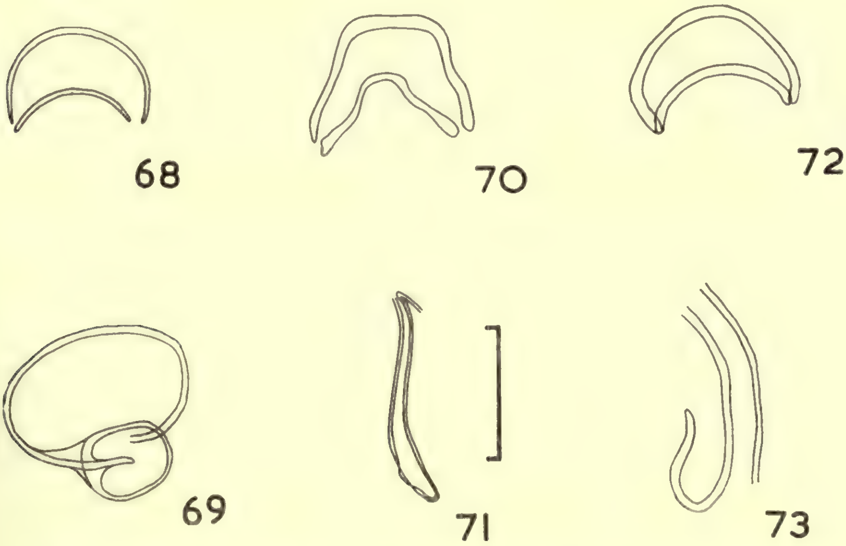
9. ***Cryptolestes turcicus*** (Grouvelle)

(Text-figs. 70, 71)

Laemophloeus turcicus Grouvelle, 1876.

This species differs externally from *C. pusilloides* principally in the shape of the pronotum, which in *C. turcicus* is almost quadrate and has projecting acute posterior angles. The pronotum may be narrowed slightly basally in large specimens somewhat as in *C. pusilloides* but the epistome is slightly convex and never concave anteriorly.

Temperate regions of the world except Australia and New Zealand ; associated with stored food.



FIGS. 68–73. *Cryptolestes*. (68) Sclerites associated with male genitalia of *C. pusilloides* ; (70) of *C. turcicus* ; (72) of *C. atulus* ; (69) sclerotization on wall of bursa copulatrix of *C. pusilloides* ; (71) of *C. turcicus* ; (73) of *C. atulus*.

Scale line = 0·1 mm.

C. turcicus is not known to breed in Central Africa but has been recorded from the BELGIAN CONGO and UGANDA (Howe & Lefkovitch, 1957). Additional records: 3 " C.T. 4.86/C.B. Esp. Peringuey/in a packet of Cocoa " in the Grouvelle collection, Paris; 3 specimens " Flour mill. Cape Town M. Howroyd 1959 " (author's collection).

10. ***Cryptolestes atulus*** **sp. n.**

(Text-figs. 72, 73)

1·8–2·2 mm. This species resembles *C. turcicus* but is black and much more shining than that species; the legs, antennae, mouthparts and the impunctate area at the base of each antenna are reddish in colour. There are only a few short setae on the head and pronotum.

S. THOMÉ, CONGO.

HOLOTYPE male " Tshuapa: Bokuma ii/iii–1954 R. P. Lootens "; paratypes as follows: 1 " Ubaugi: Gemena –xi–1935 P. Henrard "; 1 " Barumbi –vii–1925. fruit ficus pressée. Lt. J. Ghesquière "; 1 " Haut-Uele: Mauda –iii–1925. Dr. H. Schouteden "; 1 " Luebo –viii–1921. coton. Lt. Ghesquière "; 1 " Luebo 25–viii–1921. Dr. H. Schouteden "; 2 " Eala –iii–1935 J. Ghesquière "; 1 " I.R.S.A.C. Tshuapa; Terr. Bikoro, 350 m. Lac Tumba N. Leleup –x–1955 "; 1 " Ruanda: Kisenyi 1500 m. 21–viii–1953 A. E. Bertrand "; 1 " N'Gazi 14–vii–1952 "; 1 " Yangambi 5–viii–1952 " (Mus. R. Congo Belge); 3 " S. Thomé " (Muséum National d'Histoire Naturelle, Paris).

11. ***Cryptolestes atuloides*** **sp. n.**

(Text-figs. 74, 75)

1·8–2·3 mm. This species is very closely related to *C. atulus* sp. n. but differs in that it has longer, more abundant pubescence on the head and pronotum. In shape, the pronotum is closer to that of *C. ferrugineus* rather than *C. turcicus*, being rather more narrowed basally and without such strongly formed hind angles. The setae are about twice as long as the intervals between the punctures.

CONGO.

HOLOTYPE male " Luebo –viii–1921 Lt. Ghesquière. Bois mort "; allotype and 3 other paratypes with the same data as the holotype. Other paratypes: 6 " Eala –vii–1935 J. Ghesquière "; 2 " Luebo 18–viii–1921 Dr. H. Schouteden "; 3 " Haut Uele: Moto 1920 L. Burgeon "; 1 " Yangambi 23–vi–1952 Dr. Schedl s.213a "; 1 " Yangambi 3–vii–1952 s.296 "; brown specimens externally resembling *C. evansi* sp. n.; " Kamalembi (Luebo) 21–ix–1921. Dr. H. Schouteden "; " Kasal: Mukumbi 18–x–921. Dr. H. Schouteden " (Mus. R. Congo Belge); 1 " Belgian Congo 18 m(iles) S.W. of Elizabethville 1927. Dr. H. S. Evans " (British Museum (Natural History)).

12. ***Cryptolestes pusillus*** (Schönherr)

(Text-figs. 76, 77)

Cucujus minutus Olivier, 1791, *nec* Fourcroy, 1785.
Cucujus pusillus Schönherr, 1817.
Cucujus testaceus Stephens, 1831.

Cucujus crassicornis Waltl, 1839.
Laemophloeus longicornis Mannerheim, 1843.
Loemophloeus (sic) *brevis* Fairmaire, 1850.
Laemophloeus parallelus Smith, 1851.
Laemophloeus pauper Sharp, 1899.

This species resembles *C. pusilloides* in many ways and since they both occur in stored products, they have often been confused with each other. *C. pusillus* is much more pubescent, the pronotum more transverse (often as much as 1·4 times), the elytra are comparatively shorter in relation to the rest of the body, and possess two rows of punctures in the cells in addition to the striae. Small specimens of the two species and of *C. turcicus* and *C. ugandae* are virtually indistinguishable from each other externally.

I have seen specimens of this species from almost all parts of AFRICA; associated with stored food.

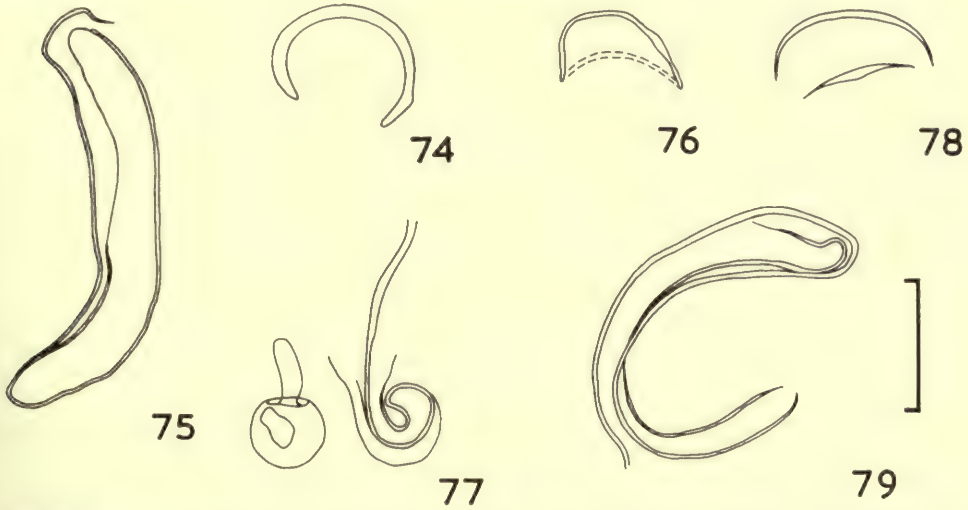
13. ***Cryptolestes ugandae*** Steel & Howe

(Text-figs. 78, 79)

Cryptolestes ugandae Steel & Howe, 1955.

Externally, this species is somewhat intermediate between *C. pusillus* and *C. pusilloides*. It has been impossible to find external characters which are really reliable. The epistome is slightly more emarginate than in those species, the anterior margin of the pronotum is just sinuate before the anterior angles and the puncturation on the head and pronotum is finer than is usual in those two species. But all these species vary so much externally that no real reliance can be placed upon these characters.

The distribution of this species is given by Lefkovitch (1957*b*) and by Howe & Lefkovitch (1957). It appears to be confined to CENTRAL AFRICA, associated with stored food.



FIGS. 74–79. *Cryptolestes* (74) Sclerites associated with male genitalia of *C. atuloides*; (76) of *C. pusillus*; (78) of *C. ugandae*; (75) sclerotization on wall of bursa copulatrix of *C. atuloides*; (77) of *C. pusillus* (spermatheca also illustrated); (79) of *C. ugandae*.

Scale line = 0·1 mm.

14. *Cryptolestes evansi* sp. n.

(Text-fig. 80)

1·8–2·2 mm. This species differs from *C. pusilloides* in that the pronotum is less transverse being scarcely broader than long and of shape similar to that of a small female *C. turcicus*. In the length of the body and in its other proportions the species is identical with *C. pusilloides*.

CONGO.

HOLOTYPE male " Belgian Congo 18 m(iles) S.W. of Elizabethville 1928 Dr. H. S. Evans " ; 2 paratypes with the same data except as follows : male dated 13.xi.1927 and female dated 13.ii.1928 (British Museum (Natural History)).

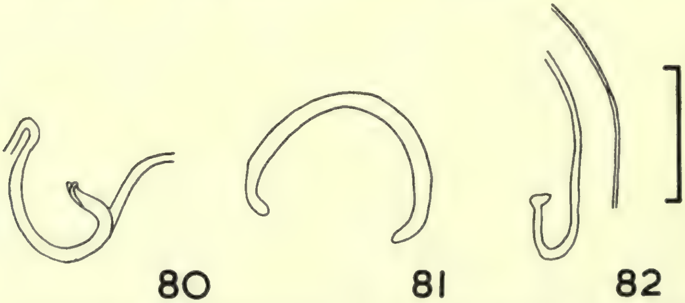
15. *Cryptolestes minimus* sp. n.

(Text-figs. 81, 82)

1·8–2·3 mm. Resembling *C. pusilloides* very closely but differing in the more sharply defined posterior angles to the prothorax, in the relative broadness of the elytra in comparison with the prothorax (it is difficult to give a value to this difference) and in the yellowish rather than reddish brown colour of the body.

ANGOLA.

HOLOTYPE male " Angola 4211.9 Alto Chicapa, sous écorce arbre tombe 27–vi–1954. Ed. Luna de Carvalho " ; 4 paratypes (2 males and 2 females) with the same data as the holotype ; 3 paratypes " Angola 1824.4.3 Serra do Moco, Luimbale (Huambo), sous écorce arbre tombe, 10–ix–1949. A. de Barros Machado " ; 1 " Angola 4194.5 Alto chicapa, gal. forest. riv. Ngungo, dans tronc pourri 27–i–1954. Ed. Luna de Carvalho " (British Museum (Natural History)).



FIGS. 80–82. *Cryptolestes* (80) Sclerotization on wall of bursa copulatrix of *C. evansi* ; (82) of *C. minimus* ; (81) sclerites associated with male genitalia of *C. minimus*. Scale line = 0·1 mm.

ACKNOWLEDGEMENTS

I am grateful to the authorities and staffs of the many museums and institutions who have lent me specimens or given me hospitality for the furtherance of this study. I wish, in particular, to mention the British Museum (Natural History) whose staff have given considerable assistance, almost weekly, during the last four years.

I am indebted to Miss C. M. F. von Hayek, Dr. E. B. Britton and Mr. R. D. Pope for the time they have given in the discussion of various points that have arisen and especially to Mr. J. A. Balfour-Browne for the care with which he has read the manuscript.

APPENDIX

Data relating to specimens collected in the Parc National de la Garamba in the Congo by the Mission H. de Saeger and referred to in the text by a number (see also de Saeger, 1956).

Reference Number	Collector	Date	Data
63	H. de Saeger	21.xii.1949	Submerged vegetation.
578	G. Demoulin	5.vi.1950	Savanna with trees.
928	H. de Saeger	2.xi.1950	Alighting on fruits of *Ficus capensis*.
1157	J. Verschuren	25.i.1951	At edge of river in high grass.
1214	,,	3.ii.1951	Between burned savanna and river in short grass.
1724	H. de Saeger	14.v.1951	Collected in leaves of *Caloncoba welwitschii*.
1803	,,	25.v.1951	Shaded pool on *Canthium* cf. *hispidum*.
2007	J. Verschuren	29.vi.1951	Under bark of *Cassia siamea* imported for building.
2062	H. de Saeger	13.vii.1951	Under bark of dead tree, wood moist and partially decayed.
2115	,,	19.vii.1951	Very moist decomposing wood.
2172	,,	30.vii.1951	From grass in savanna.
2601	,,	15.x.1951	Dead trees and branches on ground in degenerate forest.
3012	J. Verschuren	16.i.1952	Savanna, on left bank of Nambira.
3186	H. de Saeger	12.iii.1952	In fallen trees, decay hardly begun.
3235	,,	13.iii.1952	In dead trunks of *Neoboutonia*.
3296	,,	7.iv.1952	Savanna, in dry stems of *Nauclea latifolia* killed by fire in January.
3341	,,	19.iv.1952	In stems and bracts in a mass of *Oxytenanthera abyssinica*.
3379	,,	20.iv.1952	Under trunk, in spaces between the bark of *Anogeissus schimperi*.
3384	,,	28.iv.1952	Savanna with occasional trees; in fallen dead branches.
3488	,,	20.v.1952	Savanna with *Lophira* trees.
3519	,,	26.v.1952	Savanna with shrubs; fallen dead branches.
3563	,,	3.vi.1952	Thin forest; fallen dead branches.
3567	,,	30.v.1952	Savanna; in flowers, mainly *Setaria sphacelata*, *Sporobolus pyramidalis* and various Cyperaceae.

APPENDIX—*cont.*

Reference Number	Collector	Date	Data
3649	H. de Saeger	18.vi.1952	Fallen dead tree on stony rubbish.
3736	,,	4.vii.1952	Temporary pool edges, in decaying vegetation.
3738	,,	4.vii.1952	Dead tree of *Irvingia smithii*
3744	,,	7.vii.1952	Dead branches of *Erythrophloeum Chlorophora.*
3787	,,	15.vii.1952	In dead, fallen trees of *Voacanga obtusa.*
4007	,,	1.ix.1952	Savanna, in dead branches of woody shrubs.
4057	,,	16.ix.1952	Marsh, in plant layer (*Jussiaea*).

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MICROLEPIDOPTERA FROM THE NEW HEBRIDES

RECORDS AND DESCRIPTIONS OF MICROLEPIDOPTERA COLLECTED ON THE ISLAND OF ANEITYUM BY MISS EVELYN CHEESMAN, O.B.E.,

BRITISH MUSEUM
23 JUL 1962
NATURAL HISTORY

J. D. BRADLEY

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Pp. 247–271 ; *Plates* 14–27

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MICROLEPIDOPTERA FROM THE NEW HEBRIDES

RECORDS AND DESCRIPTIONS OF MICROLEPIDOPTERA COLLECTED ON THE ISLAND OF ANEITYUM BY MISS EVELYN CHEESMAN, O.B.E.

By J. D. BRADLEY

SYNOPSIS

A little over 700 specimens of Microlepidoptera collected by Miss Evelyn Cheesman on the island of Aneityum in 1955 are studied. Previous records from Aneityum are unknown, and the material provides new data on the geographical distribution of many species not previously recorded from the New Hebrides. Of the sixty-nine species represented, eighteen species and one subspecies are described as new to science. No new genera are described.

INTRODUCTION

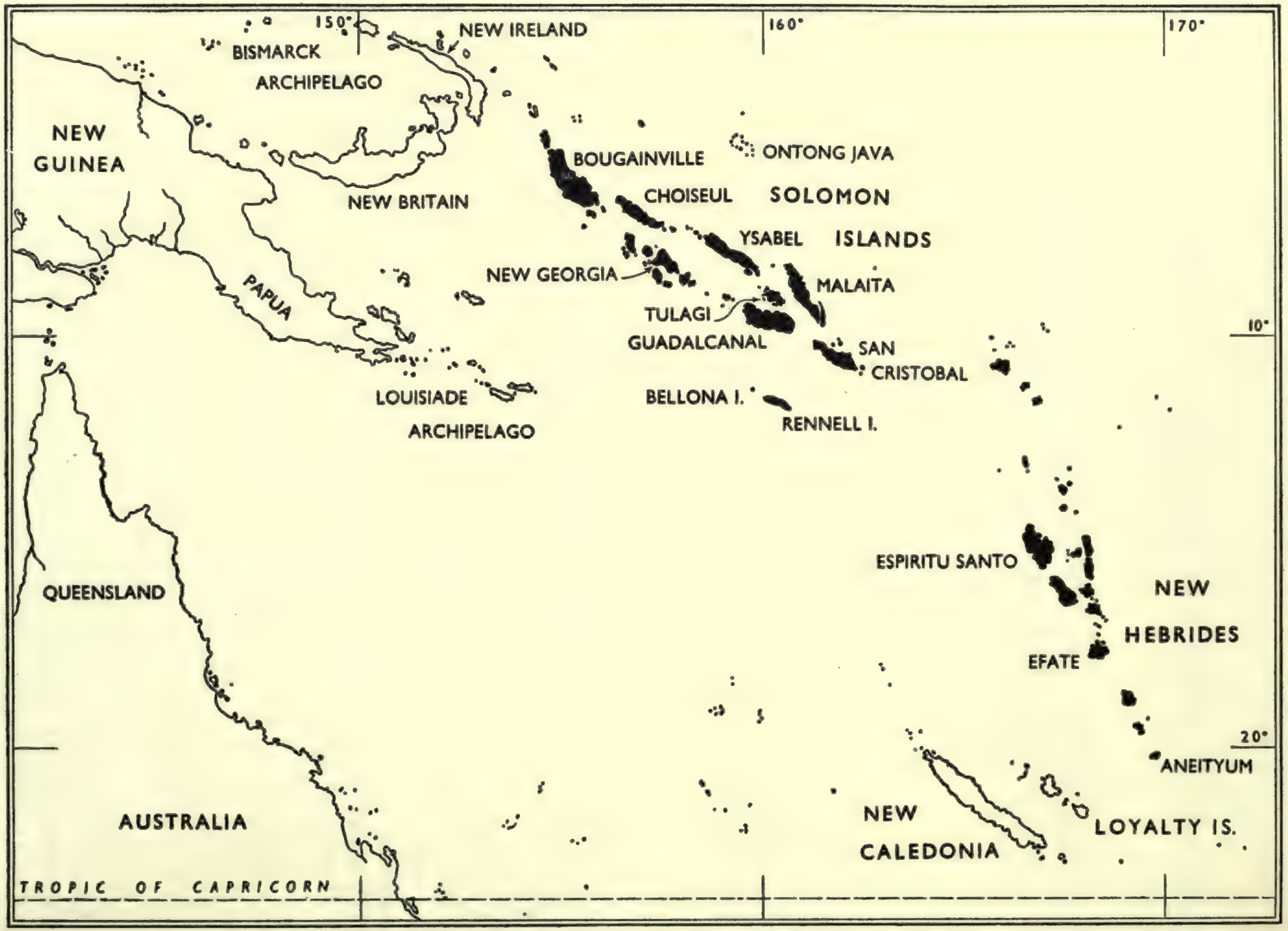
ANEITYUM is the southernmost island of the New Hebrides Archipelago, and its position in the SW. Pacific, shown in the Map on p. 250, is important biogeographically (Cheesman, 1957, *Nature*, **180** : 903–904). The Microlepidoptera collected by Miss Cheesman during her expedition to the island in 1955 have therefore proved exceptionally interesting, particularly as no previous records of this group are known from Aneityum.

The collection has greatly increased our knowledge of the distribution of many of the species and genera recorded below. A little over 700 specimens representing sixty-nine species have been examined and determined to species or genus.

All the material dealt with in the present paper was collected by Miss Cheesman during the period from March to June, 1955, both months inclusive, in the same locality, at Red Crest, 1,200 ft., 3 miles north-east of Anelgauhat. This locality data has been slightly abbreviated in the records of the species now listed. A systematic arrangement is followed ; and the geographical distribution, so far as known, is given for each previously described species.

The type specimens of the new species described below are in the British Museum (Natural History). The insects are described as seen under a low-power lens of up to ×15 magnification, and the colour terms used are principally from Ridgway's *Color Standards and Color Nomenclature.*

The illustrations of the wings, Pl. 14, are reproduced from photographs taken by Mr. N. Tanti of the photographic section of this museum. The magnification varies in the photographs and has not been indicated ; instead the measurements across the fully-spread fore wings of the actual specimens studied are given under the figure


150°
160°
170°
10°
20°
NEW IRELAND
BISMARCK
ARCHIPELAGO
NEW
GUINEA
NEW BRITAIN
PAPUA
LOUISIADE
ARCHIPELAGO
BOUGAINVILLE
ONTONG JAVA
CHOISEUL
SOLOMON
ISLANDS
YSABEL
NEW GEORGIA
MALAITA
TULAGI
GUADALCANAL
SAN
CRISTOBAL
BELLONA I.
RENNELL I.
ESPIRITU SANTO
NEW
HEBRIDES
EFATE
ANEITYUM
LOYALTY IS.
NEW
CALEDONIA
QUEENSLAND
AUSTRALIA
TROPIC OF CAPRICORN

MAP.—The South-West Pacific, showing the geographical position of Aneityum, the southernmost island in the New Hebrides.

captions. The genitalia illustrations on Pls. 15–27 are from drawings by Mr. Arthur Smith.

TORTRICIDAE

TORTRICINAE

Tortrix sp. (*sensu* Meyrick)

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 2 ♀.

These two specimens are superficially reminiscent of the New Zealand species *Tortrix excessana* (Walker), and belong to a species in the same Australian and New Zealand species-group at present accommodated in the composite genus *Tortrix* Linnaeus. There are a number of Australian species of this group described by Turner which are not known to me, and the New Hebridean specimens perhaps belong to one of these.

Nesoscopa psarodes sp. n.

(Pl. 14, fig. 1)

♂♀, 11–13 mm. Labial palpus white, suffused and irrorate with mouse grey exteriorly. Head, thorax and tegula whitish diffusely irrorate with mouse grey except front of head (face). Antenna greyish fuscous, upper side thinly clothed with white scales near base ; scape very short, whitish mixed with mouse grey. Fore wing whitish, usually mixed with grey, the grey coloration tending to form transverse striae and strigulae ; a narrow slightly oblique diffuse mouse grey basal fascia mixed with blackish on costa and containing a jet black dash below costa and a second similar dash near middle, both dashes encircled with ochraceous-orange scales ; a narrow curved mouse grey fascia at 1/4, variable and often incomplete, usually heavily overlaid with blackish on costa forming a quadrate well-defined blackish blotch ; in the type specimen the edges of the fascia are moderately well defined and sprinkled with black scales, with in some examples a few ochraceous-orange scales at middle of outer margin ; a similar straight slightly outwardly-oblique fascia at middle, usually with an admixture of blackish towards inner margin (dorsum) and on costa, proximal margin of fascia edged with ochraceous-orange at middle ; distal part of wing traversed by several irregular curved oblique blackish striae ; cilia whitish, a greyish sub-basal line. Hind wing and cilia smoke grey.

Male genitalia : Pl. 15, figs. 2 and 3.

Female genitalia : Pl. 15, fig. 1.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, vi.1955 (*L. E. Cheesman*). Genitalia slide 4911.

Allotype ♀, same data. Genitalia slide 5526.

Paratypes 15 ♂, 5 ♀, same locality data, dated from iii to vi.1955. Genitalia slide 5515 (male).

This species superficially resembles *N. exors* Meyrick, the only other known species in the genus and described from Rapa I. The males of these two species can be readily separated by differences in the uncus which can be seen without dissection by brushing away a few of the covering scales and examining with a strong lens (×20). In *exors* the uncus is broad and obtuse and has two prominent sublateral barbs beneath the tip ; in *psarodes* the uncus is slender and finger-like and is not barbed at the tip.

OLETHREUTINAE

Spilonota cryptogramma Meyrick

Spilonota cryptogramma Meyrick, 1922, *Exot. Microlep.* **2** : 520.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 23 ♂♀.

DISTRIBUTION. Fiji.

Compared with examples from Fiji, the New Hebridean specimens tend to be slightly smaller and have the blackish dashes in the discal and apical areas of the fore wing much heavier and darker, forming in some examples a continuous black stripe from middle to near apex. They possibly represent a distinct race, and when additional material from other localities becomes available their specific status will need to be reconsidered together with the species *S. infensa* Meyrick, described from Queensland, of which *cryptogramma* may prove to be no more than a subspecies.

Herpystis jejuna Meyrick

Herpystis jejuna Meyrick, 1916, *Exot. Microlep.* **3** : 16.

ANEITYUM : Red Crest, 1,200 ft., iv and v.1955, 3 ♂, 1 ♀.

DISTRIBUTION. India, Java and Solomon Is. (Rennell I.).

Eucosma euryochra **sp. n.**

(Pl. 14, fig. 2)

♂♀, 15–19 mm. Labial palpus cartridge buff suffused with cream, basal and second segments overlaid with ochreous-tawny or cinnamon-brown exteriorly. Head, thorax and tegula cartridge buff, side of crown adjacent to eye, patagia and base of tegula cinnamon-brown. Antenna and scape cartridge buff, flagellum diffusely annulate with fuscous except base. Fore wing cartridge buff or whitish, some scattered grey and cinnamon-brown scales, heaviest in female ; a narrow cinnamon-brown transverse fascia at 1/3, diffuse and weakly defined from costa to middle, thence becoming gradually more solid and darkened by an admixture of black scales, almost entirely black at inner margin (dorsum) ; basal area of wing between costa and plical fold and including upper (costad) half of fascia suffused with light violet-grey, in some examples this suffusion extends along the costal area beyond middle of wing but is usually less pronounced ; a subtriangular cinnamon-brown mixed with black blotch on inner margin beyond middle, base of blotch greater than width of fascia ; discal area without definable ocellus, sometimes shaded with pale violet-grey ; costa marked with short cinnamon-brown and blackish strigulae, beyond middle of wing these are sometimes linked with rippled strigae of cinnamon-brown scales traversing the wing, one somewhat heavier chain intermixed with black scales from termen below middle curving inwards towards costa ; a small round cinnamon-brown patch at apex centred with black and emitting a strigulation along termen ; cilia cinnamon-brown mixed with dark plumbeous. Hind wing with veins 3 and 4 stalked ; cinnamon-brown densely irrorate with fuscous scales ; cilia greyish, a slightly darker sub-basal line. Posterior tibiae in both sexes rough-scaled above to about middle.

Male genitalia : Pl. 15, fig. 4.

Female genitalia : Pl. 16, figs. 1–3.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iii.1955 (*L. E. Cheesman*). Genitalia slide 4846.

Allotype ♀, same locality data, dated iv.1955. Genitalia slide 5525.

Paratypes 10 ♂, 7 ♀, same locality data, dated from iii to iv.1955.

Provisionally placed near a species described from India, *E. legitima* Meyrick, which it superficially resembles in coloration and pattern, but it can be readily distinguished by the absence of the large blackish subapical terminal blotch present in the fore wing of *legitima*.

Bactra blepharopis Meyrick

Bactra blepharopis Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36** : 255.

ANEITYUM : Red Crest, 1,200 ft., iii and vi.1955, 3 ♀.

DISTRIBUTION. Australia (Queensland), Solomon Is., Fiji and New Hebrides.

Polychrosis orthomorpha Meyrick

Polychrosis orthomorpha Meyrick, 1928, *Exot. Microlep.* **3** : 443.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♀.

DISTRIBUTION. New Hebrides.

Crusimetra anastrepta Meyrick

Crusimetra anastrepta Meyrick, 1927, *Insects of Samoa*, **3**(2) : 71.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♂.

DISTRIBUTION. Ceylon, Sumatra, Samoa and Solomon Is.

Strepsicrates glaucothoe (Meyrick) **comb. n.**

Spilonota glaucothoe Meyrick, 1927, *Insects of Samoa*, **3**(2) : 70.
Eucosma baryphragma Meyrick, 1937, *Exot. Microlep.* **5** : 159. **Syn. n.**

ANEITYUM : Red Crest, 1,200 ft., iii and vi.1955, 3 ♂, 1 ♀.

The new synonymy above has been confirmed after examination of the types in the British Museum (Natural History).

DISTRIBUTION. Samoa and Fiji.

Strepsicrates poliophora **sp. n.**

(Pl. 14, fig. 3)

♂, 18 mm. Labial palpus white interiorly, pale gull grey exteriorly, second segment with well-defined dark mouse grey sub-basal and postmedial bands exteriorly and with apex slightly projected and suffused deep mouse grey, terminal segment indistinctly ringed with deep mouse grey at apex and suffused with similar coloration exteriorly. Head, thorax and tegula fuscous-black mixed and irrorate with pale gull grey, front of head white, a light grey patch on posterior of thorax. Antenna with notch at about 1/7, mouse grey, scape irrorate with light grey dorsally. Fore wing with broad costal fold, enclosing whitish hairs, from base to middle ; pale gull grey, costal and distal areas heavily and dorsal (inner margin) area lightly suffused and irrorate with an irregular mixture of deep mouse grey and fuscous ; an extensive almost blackish area between costa and plical fold reaching beyond middle to discal area ; a prominent tuft of raised light grey scales barred with deep mouse grey at middle of plical fold ; costa marked from before middle to apex with short blackish strigulae ; a large circular blackish pretornal patch, nearly coalescent with blackish central area, a similar larger somewhat elongate patch in terminal margin, an admixture of sayal brown scales between this and the blackish central suffusion, a light sprinkling of sayal brown scales in area of wing having darker coloration ; cilia pale gull grey irrorate with deep mouse grey, a broad deep mouse grey basal line along termen. Hind wing dark fuscous ; cilia greyish, a mouse grey sub-basal line.

Male genitalia : Pl. 17, fig. 1.

Holotype ♂, New Hebrides : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iii.1955 (*L. E. Cheesman*). Unique. Genitalia slide 4883.

Very closely related to *S. glaucothoe* (Meyrick), *S. rhothia* (Meyrick), and *S. dilacerata* (Meyrick) ; all four species no doubt originating from the same stock. *S. poliophora* may be readily distinguished from the other three species mentioned by the male genitalia which have a well-developed digitate projection on the ventral margin of the cucullus.

Mesocallyntera dascia **sp. n.**

(Pl. 14, fig. 4)

♂, 24–27 mm. Labial palpus tawny, upper edge of second segment rough-scaled towards apex and clothed with plumbeous-black scales tipped with light grey ; terminal segment very short, apex suffused plumbeous-black. Head fuscous, with an admixture of plumbeous-black strongest on frons and fore part of vertex between antennae, scales at middle and posterior of crown tipped with whitish buff. Thorax fuscous overlaid with loosely appressed leaden-metallic plumbeous scales, posterior crest mixed with tawny. Tegula tawny, shaded with dark fuscous at tip, overlaid with loosely appressed leaden-metallic plumbeous scales at base matching thorax. Antenna and scape fuscous. Fore wing brownish tawny, densely suffused with leaden-metallic plumbeous scales forming a nebulous irregular pattern over most of the wing ; markings blackish brown, distal margin of basal patch well defined, irregularly sinuous and slightly outwardly-oblique from costa at about 1/4 ; a heavy but poorly-defined triangular marking from costa beyond middle, apex of this marking confluent in discal area with a tawny dash ; a moderately well-defined inwardly-oblique slightly undulate postmedial line, parallel with termen, from dorsum near tornal angle to near costa where it merges with a somewhat diffuse subtriangular blackish brown patch a little below costal margin, this patch extending obliquely to costa and edged outwardly with a fine leaden-metallic plumbeous line from costa to termen ; a small wedge-like tawny tuft on inner margin a little proximad of postmedial line ; a similar elongate tuft on inner margin before middle ; small interneural tawny dots along termen ; a small tawny mixed with blackish subterminal dashes on veins 3 and 4, and similar blackish dashes on veins 5, 6 and 7, all forming a chain ; costa marked with short pale tawny and blackish strigulae ; cilia plumbeous, a diffuse plumbeous-black basal line not evident at tornus where cilia are paler. Hing wing and cilia light fuscous ; a slender warm buff hair pencil from mesopleura sometimes concealed in vannal fold. Abdomen fuscous with an admixture of grey, a dense patch of specialized warm buff lanceolate scales on sternum of second segment. Legs fuscous, tarsi banded or suffused warm buff, tufts on fore and middle tibiae purplish black, inner side of hind tibia cartridge buff and with a long dense pencil of warm buff hairs from base.

Male genitalia : Pl. 18, fig. 1.

Holotype ♂, New Hebrides : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, vi.1955 (*L. E. Cheesman*). Genitalia slide 6020.

Paratypes 7 ♂, same data. Genitalia slide 4866.

Allied and similar in appearance to *M. squamosa* Diakonoff, found in the Celebes and, as a subspecies, in New Guinea. Differences in the valva of the male genitalia distinguish the two species, that of *dascia* being simple and not furcate as in *squamosa*.

Olethreutes ancosema ancosema (Meyrick)

Argyroploce ancosema Meyrick, 1932, *Exot. Microlep.* **4** : 310.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 2 ♂.

Both specimens resemble the nominate form from Fiji, having the black medial marking on the fore wing unbroken, and are at least for the present referred to this subspecies. In the Solomons race, *O. ancosema solomonensis* Bradley, the medial fascia is interrupted at the middle.

DISTRIBUTION. Fiji.

Olethreutes anaprobola (Bradley)

Argyroploce anaprobola Bradley, 1953, *Proc. Hawaii. ent. Soc.* **15** : 109.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 11 ♂, 1 ♀.

DISTRIBUTION. Fiji and Solomon Is.

Cryptophlebia ombrodelta (Lower)

Arotrophora (?) *ombrodelta* Lower, 1898, *Proc. Linn. Soc. N.S.W.* **23** : 48.
Cryptophlebia carpophaga Walsingham, 1899, *Indian Mus. Notes*, **4** : 106.

ANEITYUM : Red Crest 1,200 ft., iv and v.1955, 2 ♂, 1 ♀.

DISTRIBUTION. Widespread in the Indo-Australian region, the larva being polyphagous on the leaves, pods, seeds and fruits of various tropical trees and shrubs.

Cryptophlebia iridoschema **sp. n.**

(Pl. 14, fig. 5)

♀, 15 mm. Labial palpus buff-yellow, suffused exteriorly with amber brown. Head buff-yellow, some amber brown scales at side of face adjacent to compound eye, an orbit of rather slender scales on posterior of crown behind ocellus and adjacent to compound eye. Thorax buff-yellow suffused with amber brown, most strongly anteriorly. Tegula amber brown, paler at tip. (Antennae missing.) Fore wing with basal area to middle of costa and 1/3 inner margin (dorsum) amber brown, outer edge of this area sharply defined, almost straight, inwardly-oblique from costa to inner margin, edged with whitish beyond giving way to mars yellow in distal half of wing ; a small triangular amber brown pretornal marking on inner margin ; costa marked with very short oblique amber brown strigulae in apical half, those nearest the apex heaviest, terminating as thin lines of amber brown scales ; a sprinkling of amber brown scales, sometimes arranged in short transverse chains, in distal area ; interspersed between these are very small inconspicuous patches of plumbago-grey scales ; cilia pinkish buff, a rather indistinct amber brown sub-basal line, shaded with sayal brown beyond. Hind wing mars yellow except basal 3/4 of costal area which is whitish ; cilia pinkish buff, amber brown sub-basal line, shaded with sayal brown beyond.

Female genitalia : Pl. 16, fig. 4. Bursa copulatrix spherical, surface ornamented with minute rhomboidal scutullates, on one side a pair of weakly sclerotized granulose signa are present.

Holotype ♀, New Hebrides : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheesman*). Unique. Genitalia slide 6051.

A species of distinctive appearance, having brighter coloration than is usual for the genus, and also an unusual wing pattern. In general coloration nearest the two closely related species *C. ombodelta* (Lower) and *C. vitiensis* Bradley, but readily distinguished from these and other species of the genus by the transverse division of the fore wing into two distinct colour areas.

Cryptophlebia rhynchias (Meyrick)

Platypeplus rhynchias Meyrick, 1905, *J. Bombay nat. Hist. Soc.* **16** : 586.

Aneityum : Red Crest, 1,200 ft., vi.1955, 1 ♀.

Distribution. S. India, Ceylon, Australia (Queensland), New Hebrides and Sudest I.

SCHOENOTENINAE

Schoenotenes elaphrodes **sp. n.**

(Pl. 14, fig. 6)

♂, 15 mm. Labial palpus white, terminal segment wholly or partially suffused with greyish, second segment suffused with greyish exteriorly and with an admixture of blackish grey and ochreous in upper and lower margins. Head, thorax, patagia and tegula whitish grey, tinged and partially slightly suffused with ochraceous-buff. Fore wing whitish, suffused smoke grey except distal area ; scales roughened and raised more especially in discal area ; some vertical diffuse ochraceous-orange strigulation superimposed on the greyish suffusion ; a broad black line along plical fold from near base to middle of wing, terminating a little above inner margin (dorsum) ; a blackish dot at middle joining distally a broad blackish suffusion extending obliquely to costa a little before apex ; a moderately heavy diffuse ferruginous mixed with blackish dorsal blotch at or just beyond middle ; a few faint irregular transverse ochreous mixed with blackish strigulations in whitish terminal area ; several scattered rather inconspicuous black specks along edge of inner margin ; cilia whitish, basal half shaded ochraceous-buff, a faint blackish medial line, some faint blackish dots along termen at ends of veins. Hind wing greyish fuscous, darker distally ; cilia concolorous with wing basally, white apically.

Male genitalia : Pl. 18, figs. 2 and 3.

Holotype ♂, New Hebrides : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheeseman*). Genitalia slide 5516.

Paratype 1 ♂, same locality data, dated iii.1955. Genitalia slide 6034.

This species is the only representative of the genus *Schoenotenes* Meyrick so far recorded from the New Hebrides. The centre of development of this genus is New Guinea, where the species are numerous, and it is but poorly represented elsewhere in the Indo-Australian region. The genus contains species arrangeable in a natural sequence according to fascia and genitalia development, and *elaphrodes* belongs in the group with subrectangular or subtriangular fore wings in which rough-scaling is reduced and may be present only in plical and discal scale tufts. The male genitalia are without hami, with pendulous socii, hooked gnathus and simple valva.

CHLIDANOTINAE

Caenognosis incisa Walsingham

Caenognosis incisa Walsingham, 1900, *A Monograph of Christmas Island*, p. 79.

ANEITYUM : Red Crest, 1,200 ft., iii and iv.1955, 12 ex.

DISTRIBUTION. Australia (Queensland), New Guinea, Philippines and Christmas I.

Trymalitis cataracta Meyrick

Trymalitis cataracta Meyrick, 1907, *J. Bombay nat. Hist. Soc.* **18** : 153.
Trymalitis optima Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36** : 294.
Trymalitis macarista Meyrick, 1934, *Exot. Microlep.* **4** : 489.

ANEITYUM : Red Crest, 1,200 ft., iii, iv and v.1955, 2 ♂, 1 ♀.

DISTRIBUTION. E. Australia, New Guinea, Solomon Is., Bismarck Archipelago, Fiji, Siam, Andaman Is., Ceylon and Africa.

GELECHIIDAE

Stegasta variana Meyrick

Stegasta variana Meyrick, 1904, *Proc. Linn. Soc. N.S.W.* **29** : 394.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♂.

DISTRIBUTION. Widely distributed in the Ethiopian and Indo-Australian regions.

Thiotricha oxyopis Meyrick

Thiotricha oxyopis Meyrick, 1927, *Insects of Samoa*, **3**(2) : 80.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 1 ♂.

DISTRIBUTION. Samoa and Solomon Is.

Thiotricha sp.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 1 ♂.

The wings of the specimen are rubbed and the species cannot be properly identified, but the genitalia indicate affinity with *T. oxyopis* Meyrick.

Thiotricha sp.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♂, damaged.

Superficially similar to *T. tethela* Bradley which occurs in the Solomon Is.

Idiophantis lomatographa sp. n.

(Pl. 14, fig. 7)

♀, 14 mm. Labial palpus whitish interiorly, drab exteriorly, terminal segment with a deep violaceous iridescence exteriorly. Head with face warm buff, crown ochraceous-buff, suffused with glossy dark violet-grey medially. Antenna and scape whitish, suffused with dark violet-grey anteriorly. Thorax and tegula purplish hair-brown. Fore wing with termen deeply excavated beneath linear upturned apical prominence ; drab, costal edge paler, markings confined to distal area ; an obtusely bent greyish white (plumbeous) blackish-edged subterminal streak, thickened and pure white at costa, preceded by an orange streak thinly edged blackish ; area distad of subterminal streak orange on upper half, pale apricot yellow on lower half ; a thick plumbeous streak along costa towards apex ; a large mixed drab and black circular marking at middle of termen, a similar dash above in deep excavation beneath apical prominence, a third dash below a little before mid-way to tornus reaching inward from termen to middle of yellow blotch ; cilia concolorous, tufted and white tipped with dark grey at extremity of apical projection, gold and iridescent reflections opposite mid-termen marking. Hind wing greyish, whitish around apex ; cilia concolorous, a black basal line at apex. Abdomen purplish hair-brown above, cartridge buff below. Legs cartridge buff, suffused purplish hair-brown exteriorly.

Female genitalia : Pl. 19, figs. 1 and 2. Ostium very small, circular, situated centrally in a slight depression proximad to a deep U-shaped excavation in caudal margin of ostial plate. Ductus bursae filamentous to middle thence broadening considerably to bursa copulatrix, which is spherical and has a very long convoluted filamentous tube (possibly ductus seminalis) arising from proximal half.

Holotype ♀, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iv.1955 (*L. E. Cheesman*). Unique. Genitalia slide 6580.

Related to *I. discura* Meyrick, an Asiatic species, and to *I. callicarpa* Meyrick, a Samoan species ; and distinguished by the blackish dash on the termen of the fore wing toward the tornus, not present in other species of the genus.

Idiophantis soreuta Meyrick

Idiophantis soreuta Meyrick, 1906, *J. Bombay nat. Hist. Soc.* **17** : 139.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♀.

DISTRIBUTION. Ceylon and St. Matthias I.

Autosticha silacea sp. n.

(Pl. 14, fig. 8)

♂♀, 12–14 mm. Labial palpus warm buff, diffusedly irrorate with fuscous exteriorly. Head, thorax, tegula, antenna and scape warm buff ; thorax and tegula diffusedly irrorate with dark brown and fuscous scales with a weak sheen ; antenna weakly marked with fuscous segmental bars anteriorly, diffuse and less conspicuous in male. Fore wing warm buff, whole wing diffusedly irrorate with dark brown and fuscous scales with a weak purplish sheen ; stigmata weak and obscure, plical slightly basad of discal, second discal hardly discernible at end of cell in middle; cilia warm buff, suffused greyish ; a diffuse dark grey sub-basal line. Hind wing uniformly whitish cream-buff ; cilia concolorous. Legs warm buff, weakly irrorate with fuscous exteriorly.

Male genitalia : Pl. 17, figs. 2 and 3. Tegumen margin broadly produced ventrally. Valva with weakly sclerotized glabrous area at middle of costa. Uncus moderately stout, obtuse. Gnathus produced medially to a long, slender, digitate point.

Female genitalia : Pl. 20, figs. 1 and 2.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iii.1955 (*L. E. Cheesman*). Genitalia slide 6038.

Allotype ♀, same locality data, dated iv.1955. Genitalia slide 6577.

Paratype 1 ♂, same data as holotype. Genitalia slide 6527.

Superficially similar to *A. brunnea* Bradley, from the Solomon Is., but distinguished by the lighter coloration. The structure of the male genitalia of *silacea* indicates a close relationship to *A. solita* (Meyrick), a Fijian species, and *A. banausopa* (Meyrick), **comb. n.**, from the New Hebrides, and also to certain other species at present in the composite genus *Autosticha* Meyrick. The present generic placing is tentative. *A. banausopa* was originally described in the genus *Pachnistis* Meyrick and has now been transferred because of its close relationship, evident from the morphology of the genitalia, with *A. solita*. The latter species was originally described in *Pachnistis* but was later transferred by Meyrick (Meyrick *in* Wytsman, 1925, *Genera Insectorum*, fasc. 184 : 256).

A. silacea is larger than *banausopa* and *solita*, both these species having a wing expanse of 10–11 mm., and is further distinguished by its lighter ochreous coloration, which in those two species approaches dark brown. The venation of the fore wing also differs ; in *silacea* vein 7 is present, and veins 8 and 9 arise from vein 7 ; in *banausopa* and *solita* vein 7 of the fore wing is absent (possibly coincident with vein 8), and veins 8 and 9 are stalked or connate. The generic value of the stalking of vein 9 with vein 7 in the fore wing in the *Autosticha* group of genera seems doubtful as the venation appears to vary between closely related species, but it may be reliable specifically. The marginal lobe developed ventrally on the tegumen in the male genitalia may be a character of generic importance, and is present in *silacea*, *banausopa* and *solita*.

SCAEOSOPHIDAE

Bathraula simulatella (Walker)

Cryptolechia simulatella Walker, 1864, *Cat. Lep. Ins. B.M.* **29** : 747.
Cryptolechia niveosella Walker, 1864, *Ibid.* **29** : 747.

ANEITYUM : Red Crest, 1,200 ft., v.1955, 1 ♂.

DISTRIBUTION. Sarawak, Borneo, Philippines, Bismarck Archipelago and Society I.

COSMOPTERYGIDAE

Labdia clodiana Meyrick

Labdia clodiana Meyrick, 1927, *Exot. Microlep.* **3** : 384.

ANEITYUM : Red Crest, 1,200 ft., v.1955, 1 ♂.

DISTRIBUTION. New Hebrides.

Labdia saliens Meyrick

Labdia saliens Meyrick, *Exot. Microlep.* **3** : 385.

ANEITYUM : Red Crest, 1,200 ft., iii, iv and v.1955, 14 ♂♀.

DISTRIBUTION. New Hebrides and Solomon Is.

Labdia calida Meyrick

Labdia calida Meyrick, 1921, *Exot. Microlep.* **2** : 411.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♀.
DISTRIBUTION. Fiji.

Labdia cedrinopa Meyrick

Labdia cedrinopa Meyrick, 1928, *Exot. Microlep.* **3** : 386.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 2 ♀.
DISTRIBUTION. New Hebrides (Efate I.).

Proterocosma triplanetis Meyrick

Proterocosma triplanetis Meyrick, 1886, *Trans. ent. Soc. Lond.* **1886** : 293.

ANEITYUM : Red Crest, 1,200 ft., iv and vi.1955, 2 ♀.
DISTRIBUTION. Tonga, Fiji, Samoa, Solomon Is. and New Hebrides.

Limnaecia microglypta Meyrick

Limnoecia [*sic*] *microglypta* Meyrick, 1928, *Exot. Microlep.* **3** : 393.

ANEITYUM : Red Crest, 1,200 ft., vi.1955, 1 ♂.
DISTRIBUTION. New Hebrides (Efate I.).

Limnaecia arsitricha Meyrick

Limnoecia [*sic*] *arsitricha* Meyrick, 1927, *Insects of Samoa*, **3**(2) : 93.

ANEITYUM : Red Crest, 1,200 ft., iv. and v.1955, 1 ♂, 1 ♀.
DISTRIBUTION. Samoa, Solomon Is. and New Hebrides.

Ascalenia sp.

ANEITYUM : Red Crest, 1,200 ft., iv and v.1955, 5 ♀.

Representing a species superficially approaching *A. armigera* Meyrick but with general coloration considerably darker.

A. armigera is known only from two male specimens ; one the type from Fiji, and the other a specimen from the Solomon Is. As the specimens from the New Hebrides are females it has not been possible to make a genitalic comparison with *armigera*. It would be particularly interesting if this could be done, since the male genitalia of *armigera* have specialized setae on the valva which may be homologous with those found in the highly specialized genus *Hyposmochoma* Butler, endemic in the Hawaiian Islands.

CARPOSINIDAE

Peragrarchis rodea Diakonoff

Peragrarchis rodea Diakonoff, 1950, *Bull. Brit. Mus. (nat. Hist.), Ent.* **1** : 299.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 1 ♂.

DISTRIBUTION. New Guinea.

Peragrarchis pelograpta (Meyrick), **comb. n.**

Meridarchis pelograpta Meyrick, 1929, *Trans. ent. Soc. Lond.* **76** : 502.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 1 ♂, 1 ♀.

The New Hebridean specimens are smaller than specimens from the Austral Is., the only other known locality for this species, and slight genitalic differences in the male, particularly in the aedeagus, indicate some degree of subspeciation.

DISTRIBUTION. Austral Is.

***Peragrarchis minima* sp. n.**

(Pl. 14, fig. 9)

♂, 14 mm.; ♀, 15 mm. Labial palpus in male about 1½ width of eye, subascending ; in female about 3 times width of eye, second segment being greatly extended, porrect ; cartridge buff, second segment fuscous below and exteriorly to near dorsal margin, terminal segment with dark fuscous medial ring. Antennal ciliations in male 2–3 times width of shaft basally to near middle, gradually shortening towards apex to less than width of shaft, which is clothed dorsally with cartridge buff scales. Head, thorax, tegula and antennal scape cartridge buff. Fore wing cartridge buff irregularly suffused with tawny and irrorate with fuscous and fuscous-black, some scales grouped as raised tufts ; 7 or 8 irregular fuscous-black elongate spots on costa ; and ill-defined diffuse triangular patch resting on costal spots from middle to 4/5, extending across wing beyond middle to fold, its apex truncate, containing a blackish tuft or tufts in disc ; termen outlined with tawny ; a diffuse poorly-defined tawny mixed with blackish subterminal fascia ; cilia grey, basal half darker, minutely irrorate with black and whitish specks. Hind wing light grey ; cilia matching.

Male genitalia : Pl. 22, figs. 1 and 2. Valva fused along basal portion of sacculus ; cucullus weakly sclerotized, bipartite to near base—a characteristic of the genus—halves linear ; sacculus with sclerotized denticulate subventral ridge in basal half, a strong curved tooth at base, a heavy denticulate apical patch preceded by a solitary, longer, aculiform tooth curved cephalad to nearly meet the subventral ridge. Aedeagus about as long as distance from apex of uncus to end of saccus, moderately sclerotized, dilated before middle, apex asymmetrical and produced at one side to a long slender point ; two short, longitudinal, external patches of coarse close-set spine-like setae at about middle, approximate and to one side, one patch slightly larger ; a densely compact subapical patch of hair-like setae internally.

Female genitalia : Pl. 21, figs. 1–3.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iii.1955 (*L. E. Cheesman*). Genitalia slide 6029.

Allotype ♀, same data. Genitalia slide 6055.

Related to the two closely allied species *Peragrarchis pelograpta* (Meyrick), mentioned above, and *Peragrarchis syncolleta* (Meyrick), **comb. n.**, which occurs in the Solomon Is. and the Andamans. Superficially most similar to *pelograpta* but smaller in size.

***Meridarchis celidophora* sp. n.**

(Pl. 14, fig. 10)

♀, 18–22 mm. Labial palpus porrect, about 3 times as long as width of head ; white, basal segment suffused fuscous exteriorly, second segment strongly irrorate with fuscous below and exteriorly except at apex and upper margin of apical 2/3, terminal segment with diffuse fuscous sub-basal ring. Head, thorax and tegula white, head weakly irrorate with dark fuscous on crown and laterally, anterior margin of thorax and basal half of tegula strongly suffused fuscous, posterior half of thorax thinly irrorate with fuscous-black. Antenna sordid white, weakly annulate with fuscous towards base ; scape white. Fore wing white, dusted with fuscous, markings fuscous and fuscous-black ; an inwardly-oblique basal patch, darker on costa, outer margin straight and edged with raised scales ; an elongate solid fuscous-black costal marking before middle, succeeded by three smaller spots equidistant apart to 3/4 ; a similar smaller spot at 4/5 ; an ill-defined diffuse triangular fuscous mixed with fuscous-black fascia resting on costal spots from before middle to 3/4, extending across wing to inner margin (dorsum), strongest at middle and distally, most diffuse inwardly towards inner margin, accompanied by tufts of raised scales in discal area ; a series of diffuse confluent spots along termen ; a weak greyish fuscous sub-basal shade line parallel with outer edge of medial fascia (or patch) nearer to termen than to fascia ; cilia whitish grey, white at tornus, a greyish fuscous medial line along termen. Hind wing whitish grey ; cilia matching, whitish basally and apically. Abdomen cartridge buff or whitish, suffused fuscous laterally. Legs whitish, marked with fuscous-black exteriorly.

Female genitalia : Pl. 19, fig. 3. Ostium concealed, limen weakly sclerotized, curved ventrally, dorsal wall produced as a thin, nearly quadrate plate with blunt digitate medial process. Ductus bursae dilated and weakly sclerotized for short distance beyond ostium, weakly scobinate. Bursa copulatrix membranous, pyriform, without signum.

Holotype ♀, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheesman*). Genitalia slide 6054.

Paratypes 7 ♀, same locality data, dated iii, v and vi.1955.

Near the Japanese *M. excisa* Walsingham, and closely resembling it superficially except that the medial fascia or patch on the fore wing is more extensive and pronounced, but differing in coloration which in *excisa* is more cinereous or grey.

***Carposina stationaria* Meyrick**

Carposina stationaria Meyrick, 1928, *Exot. Microlep.* **3** : 402.

ANEITYUM : Red Crest, 1,200 ft., iv., v and vi.1955, 15 ♂♀.

DISTRIBUTION. New Hebrides.

***Heterogymna cheesmanae* sp. n.**

(Pl. 14, fig. 11)

♂, 30–32 mm.; ♀, 36–40 mm. Labial palpus in male about 1½ times width of eye, slightly recurved ; in female about 2½ times width of eye, porrect ; cartridge buff, basal and second segments overlaid below and exteriorly, except apex of second segment, with mars brown, terminal segment with a broad moderately distinct medial annulus interrupted in male interiorly. Head cartridge buff, upper part of front and crown mixed with civette green laterally, an admixture of mars brown medially. Antenna strongly ciliate in male, filiform in female ; cartridge buff suffused with mars brown, darker basally ; scape civette green. Thorax civette green, a broad transverse mars brown patch anteriorly, a similar small patch laterally slightly posterior of middle. Tegula civette green, usually with strong, mars brown irrorate with mummy brown markings at base and on apical half ; in some examples a variable admixture of cartridge buff towards apex. Fore wing cartridge buff solidly overlaid with light elm green or bice green (in worn specimens the green coloration gives way to cartridge buff) lightly irrorate with mars brown ; markings mars brown varying to very dark mummy brown ; a small inwardly-oblique basal patch with an admixture of green near costa ; male with costal fold reaching to beyond middle, heavily marked with mars brown in basal half and beyond middle ; female with an irregular mars brown patch on costa at 1/4, a narrow mars brown marking from before middle to 3/5 of costa ; in male this marking is shortened by the costal fold ; in both sexes three small angular mars brown costal spots converging and separated by white flecks on costal margin ; a narrow, inwardly-oblique irregular transverse band at 1/4 interrupted before middle ; a broad blotch-like incomplete fascia at 2/3 interrupted and mixed with green, edges irregular and diffuse, extending to a little beyond middle of wing and disappearing towards inner margin : a narrow irregular subterminal band indented at middle ; termen narrowly edged with small interconnected irregular wedge-shaped spots not reaching apex ; inner margin (dorsum) strongly irrorate or overlaid with mars brown ; cilia brownish, a darker basal line. Hind wing greyish drab, male with weak cubital pecten ; basal 2/3 of inner margin broadly whitish, in male including basal area of wing ; cilia whitish, shaded with pale drab basally. Abdomen cartridge buff strongly overlaid with fuscous ; in male a cartridge buff anal tuft.

Male genitalia : Pl. 22, figs. 3 and 4. Uncus curved, slender, digitate, acutely pointed ; cucullus very narrow, slightly tapered, apex rounded ; sacculus moderately broad, a small apical tooth ; basal section of valva with short stout tooth near base of cucullus ; vinculum evenly rounded, produced proximally to an obtuse point. Aedeagus extremely large and stout, containing about six large blade-like cornuti.

Female genitalia : Pl. 20, figs. 3 and 4.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, vi.1955 (*L. E. Cheesman*). Genitalia slide 4890.

Allotype ♀, same locality data, dated v.1955.

Paratypes 5 ♂, 1 ♀, same locality data, dated iv and vi.1955. Genitalia slides 4828 (female) and 4889 (male).

A species of striking appearance and readily distinguished by the green coloration from other species of the genus. The male genitalia are similar to those of *H. ochrogramma* Meyrick.

I name this remarkable and singularly distinguished species after the collector, Miss Evelyn Cheesman.

Coscinoptycha improbana Meyrick

Coscinoptycha improbana Meyrick, 1881, *Proc. Linn. Soc. N.S.W.* **6** : 701.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 7 ♂, 43 ♀.

DISTRIBUTION. Australia (Queensland and N.S. Wales).

HELIODINIDAE

Hieromantis munerata Meyrick

Hieromantis munerata Meyrick, 1924, *Exot. Microlep.* **3** : 66.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 10 ♂♀.

DISTRIBUTION. Fiji, Samoa, New Hebrides.

Stathmopoda periclina Meyrick

Stathmopoda periclina Meyrick, 1938, *Trans. R. ent. Soc. Lond.* **89** : 520.

ANEITYUM : Red Crest, 1,200 ft., iii and vi.1955, 2 ♂, 1 ♀.
DISTRIBUTION. New Guinea and Solomon Is.

The type female is the only example known from Papua and has the abdomen missing, so that the identity of neither the New Hebridean nor the Solomon Islands specimens can be confirmed by examination of the genitalia until more topotypical material becomes available. Slight superficial differences are evident in coloration and markings of the fore wings of the examples examined from the three localities.

Stathmopoda imperator Bradley

Stathmopoda imperator Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 103.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 2 ♀.
DISTRIBUTION. Solomon Is.

Stathmopoda electrantha Meyrick

Stathmopoda electrantha Meyrick, 1927, *Exot. Microlep.* **3** : 377.
Stathmopoda transvecta Meyrick, 1927, *loc. cit.*

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 16 ♂♀.
DISTRIBUTION. New Hebrides and Solomon Is.

Stathmopoda sp.

ANEITYUM : Red Crest, 1,200 ft., iii, v and vi.1955, 5 ♂.

The specimens are in poor condition but apparently belong to a species having uniform yellowish-buff coloration on the fore wing with no heavy or extensive markings and with an orange or ferruginous patagia (collar).

GLYPHIPTERYIGIDAE

Imma ochrophara sp. n.

(Pl. 14, fig. 12)

♂, 19 mm. Labial palpus light orange-yellow, second segment suffused drab below and at base exteriorly, paler interiorly ; terminal segment similarly suffused exteriorly. Head pale orange-yellow, crown suffused with drab. Antenna and scape light orange-yellow. Patagia pale orange-yellow suffused drab. Thorax and tegula drab, weakly violaceous, thorax with light orange-yellow posterior crest. Fore wing light orange-yellow, basal half except edge of costa wholly overlaid with drab, with a weak violaceous iridescence, distal edge of this area diffuse, strongly and evenly convex from before middle of costa to a point opposite on inner margin ; a large similarly coloured patch beyond middle in upper discal area, resting on costa, extending to or a little beyond middle, outer (distal) margin convex, inclined towards costa, followed by a line of darker interneural spots, inner (proximal) edge slightly outwardly-oblique, meeting lower (dorsal) edge at end of cell, a small darker spot in angle thus formed, a similar spot obliquely above in cell and set in margin of marking ; a blackish somewhat diffuse thin subterminal line ;

cilia drab, darker basally. Hind wing blackish hair-brown, thinly scaled from beyond middle to base, semitransparent basally ; a yellowish hair-pencil in slight costal fold on upper surface near base ; cilia drab, darker basally. Legs light orange-yellow exteriorly, whitish interiorly ; middle and posterior tibiae marked with drab dorsally ; posterior tarsi wholly whitish.

Male genitalia : Pl. 23, fig. 1.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iv.1955 (*L. E. Cheesman*). Unique. Genitalia slide 6040.

A distinctive species perhaps allied to the Solomon Islands species *I. thyriditis* Meyrick, from which it may be distinguished by the basal marking of the fore wing which in *thyriditis* is with the outer edge straight and outwardly-oblique from costa.

Imma oxystoma **sp. n.**

(Pl. 14, fig. 13)

♂♀, 15–17 mm. Labial palpus cartridge buff in male, cream-buff in female ; a weak admixture of fuscous-black interiorly ; male with second segment compressed laterally and proportionately widened, strongly suffused with fuscous-black exteriorly ; terminal segment modified into a fine hair-like curved dark spine ; female second segment cylindrical, with a broad fuscous medial band ; terminal segment normal, cylindrical, obtuse, a small fuscous-black marking near base exteriorly. Head Prout's brown ; anterior quarter of thorax and whole of tegula chestnut-brown, tegula somewhat irrorate apically with mummy brown mixed with a trace of whitish and elongated with hair-like mummy brown scales, middle of thorax whitish suffused with a mixture of chestnut-brown and grey, posterior of thorax fuscous-black, with a trace of whitish irroration in caudal margin. Fore wing chestnut-brown mixed with mummy brown, basal third overlaid with blackish, edged distally with scattered iridescent violet-plumbeous scales ; three moderately large well-defined mustard yellow elliptical spots with suffused fuscous centres on costa, first beyond blackish basal area, second a little beyond middle, third at about 3/4 ; an elongate transverse blackish bar at end of cell (along discocellulars), a sprinkling of iridescent violaceous scales beyond ; a small blackish dot contiguous with inner margin of third costal marking ; a similar pre-apical dash on costa ; termen outlined with a thin blackish line in which are set minute pale mustard yellow dots at end of radial veins ; cilia fuscous. Hind wing light fuscous, basal half thinly scaled, subhyaline ; cilia paler, with a fuscous basal line.

Male genitalia : Pl. 23, figs. 2 and 3.

Female genitalia : Pl. 24, figs. 1 and 2.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iii.1955 (*L. E. Cheeseman*). Genitalia slide 4884.

Allotype ♀, same data. Genitalia slide 4875.

Paratype 1 ♂, same data.

This species shares the peculiar modified labial palpus in the male with *I. chelacma* Meyrick, from Samoa, and also has veins 7 and 8 of the fore wing stalked, and vein 8 to the costa.

BLASTOBASIDAE

Blastobasis anthoptera Lower

Blastobasis anthoptera Lower, 1907, *Trans. R. Soc. S. Austr.* **31** : 118.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 2 ♂, 9 ♀.

The identification of the above specimens is based on two examples of this species in the British Museum (Natural History) collection from the New Hebrides. Both examples have data labels "Efate I., Vila, vii.1925, P. A. Buxton" and were determined by Meyrick.

DISTRIBUTION. Australia (Queensland).

Blastobasis sp.

ANEITYUM: Red Crest, vi.1955, 1 ♀.

Superficially reminiscent of *B. transcripta* Meyrick, which occurs in China and India.

YPONOMEUTIDAE

Yponomeuta meracula sp. n.

(Pl. 14, fig. 14)

♂♀, 21–24 mm. Labial palpus white, upper side of second segment and whole of basal 2/3 of terminal segment overlaid with fuscous-black. Head, thorax and tegula wholly white. Antenna dark grey, whitish near base; scape pure white. Fore wing smooth-scaled, slightly glossy, snow white; anterior margin of costa strongly marked with fuscous-black basally, rather inconspicuous viewed directly from above; cilia matching. Hind wing mouse grey, lighter anteriorly and becoming white around apex and part of way along terminal margin, white or whitish in basal area and part of way along inner margin. Abdomen white.

Male genitalia: Pl. 25, figs. 1 and 2.

Female genitalia: Pl. 24, figs. 3–5.

Holotype ♂, NEW HEBRIDES: Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheesman*).

Allotype ♀, same locality data, dated iii.1955. Genitalia slide 4873.

Paratypes 6 ♂, 13 ♀, same locality data, dated iii, v and vi.1955. Genitalia slide 4905 (male).

This species is atypical of the genus in having the fore wing wholly white and unspotted and without markings except at base of anterior edge of costa. It is the sole representative of this genus known from the New Hebrides, and may be tentatively placed next to the Australian species *H. paurodes* Meyrick which is typically spotted.

Anticrates difflua hebridensis ssp. n.

(Pl. 14, fig. 15)

Anticrates difflua Meyrick, 1927, *Insecta of Samoa*, **3** (2): 106.

The examples of this species from the New Hebrides are intermediate superficially as well as geographically between the nominate race from Samoa and *A. difflua rennellensis* from the Solomon Is., and apparently represent a distinct subspecies. Their general coloration is brighter and stronger than in *difflua difflua*, but the bold reticulate markings of the fore wing do not attain the deep coral red coloration as in *difflua rennellensis*. The markings on thorax and head are likewise stronger than in the nominate form but are not the deep reddish colour as in *rennellensis*. The New Hebridean specimens are slightly larger—by 1–2 mm.—than specimens from Samoa and the Solomon Is.

Male genitalia : similar to those of *difflua difflua* and *d. rennellensis*. The genitalia of both sexes of this species are illustrated in a previous paper (Bradley, 1957, *Nat. Hist. Rennell I., British Solomon Is.* **2** (19) : figs. 65–69).

Holotype ♂, New Hebrides : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheesman*). Genitalia slide 4916.

Paratype 1 ♂, same data.

PLUTELLIDAE

Plutella maculipennis (Curtis)

Cerostoma maculipennis Curtis, 1832, *Brit. Entom.* **9** (105), No. 420.

Aneityum : Red Crest, 1,200 ft., v.1955, 1 ♂, 1 ♀.

Distribution. Cosmopolitan.

Orthenches delosticha **sp. n.**

(Pl. 14, fig. 16)

♂, 11 mm. Labial palpus cartridge buff, second segment suffused with fuscous exteriorly except at apex, an admixture of warm buff interiorly ; terminal segment tipped with fuscous-black. Head, thorax and tegula cartridge buff, lightly shaded with cream-buff, more especially at side of head ; lower part of front of head cartridge buff ; a narrow moderately distinct fuscous medial line on thorax. Fore wing cartridge buff thinly irrorate with blackish, more concentrated towards base ; veins diffusely etched with ochraceous-buff with variable admixture of drab ; a small blackish plical dash ; a similar round discal spot at 2/3 with a minute blackish speck immediately costad ; a pair of rather thick blackish dashes close together near middle of termen ; a single similar pre-apical dash on costa ; cilia warm buff, a cartridge buff medial line from apex to near tornus broadly edged with drab. Hind wing smoke grey ; cilia matching, cream-buff basally. Abdomen and legs light buff ; legs suffused greyish exteriorly.

Male genitalia : Pl. 25, figs. 3 and 4.

Holotype ♂, New Hebrides : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheesman*). Genitalia slide 6534.

Paratypes 4 ♂, same locality data, dated iii and iv.1955.

The geographical distribution of the species in the genus *Orthenches* Meyrick is of considerable interest. The genus is strongly developed in New Zealand, but is well represented in Australia and also by several species in South America (Chile and Argentina), and one species is known from Assam. *O. delosticha* is superficially nearest the New Zealand species *O. chlorocoma* Meyrick, but is readily distinguished by the radiating nervure lines on the fore wing. The wing venation is slightly unstable, vein 2 of the fore wing being approximate, connate or very shortly stalked with vein 3 at the end of the cell.

EPERMENIIDAE

Epermenia symmorias Meyrick

Epermenia symmorias Meyrick, 1923, *Exot. Microlep.* **3** : 52.

Aneityum : Red Crest, 1,200 ft., vi.1955, 1 ♂.

Distribution. Fiji.

LITHOCOLLETIDAE

Acrocercops euthycolona Meyrick

Acrocercops euthycolona Meyrick, 1931, *Exot. Microlep.* **4** : 46.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♀.
DISTRIBUTION. Java, India, Malaya and Solomon Is.

Acrocercops cramerella (Snellen)

Gracilaria [*sic*] *cramerella* Snellen, 1904, *Tidschr. Ent.* **46** : 84.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 8 ♂♀.
DISTRIBUTION. Widespread in the Indo-Australian region.

Caloptilia xanthopharella (Meyrick)

Gracilaria [*sic*] *xanthopharella* Meyrick, 1880, *Proc. Linn. Soc. N.S.W.* **5** : 141.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♀.
DISTRIBUTION. Fiji and E. Australia.

LYONETIIDAE

Opogona mendanai Bradley

Opogona mendanai Bradley, 1961, *Bull. Brit. Mus.* (*nat. Hist.*), *Ent.* **10** : 161.

ANEITYUM : Red Crest, 1,200 ft., iii.1955, 1 ♀.
DISTRIBUTION. Solomon Is.

Anastathma callichrysa Meyrick

Anastathma callichrysa Meyrick, 1886, *Trans. ent. Soc. Lond.* **1886** : 290.

ANEITYUM : Red Crest, 1,200 ft., vi.1955, 4 ex.
DISTRIBUTION. Fiji.

Ereunetis capnosticta **sp. n.**

(Pl. 14, fig. 17)

♂♀, 10–11 mm. Labial palpus in male loosely scaled, apical segment tufted with long fine scales ; in female normal, scales closely appressed, slightly roughened beneath, apex of terminal segment obtuse and roughened ; in both sexes cream-buff, terminal segment in female strongly suffused with fuscous ; terminal segment in male with a small fuscous patch on upper margin at base. Head cream-buff, crown sometimes mixed with greyish. Antennal scape cream-buff ; flagellum greyish fuscous. Thorax cream-buff, a diffuse hair-brown or fuscous medial line and a similar weak suffusion laterally. Tegula cream-buff strongly suffused with hair-brown or greyish fuscous. Fore wing cream-buff sparsely and irregularly irrorate with hair-brown or greyish fuscous scales ; markings consisting mainly of diffuse, somewhat irrorate, small hair-brown or greyish fuscous subquadrate or rounded patches scattered irregularly over the wing, usually larger and often darker near the base, in strongly marked specimens these markings are more extensive and occasionally coalesce ; an elongate patch at base of costa ; a blackish apical dot ; cilia cream-buff suffused with hair-brown except at apices, a faint sub-basal line. Hind wing somewhat shining light drab, darker and weakly infuscate along inner margin distally ; cilia hair-brown ; male with a specialized pencil of fine cream-buff hairs arising near base a little below costa and reaching beyond middle. Legs cream-buff suffused with hair-brown exteriorly. Abdomen greyish hair-brown, paler beneath.

Male genitalia : Pl. 26, figs. 1 and 2. Aedeagus with a small internal sheaf of about 5 or 6 minute cornuti.

Female genitalia : Pl. 26, fig. 3.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iv.1955 (*L. E. Cheesman*). Genitalia slide 6537.

Allotype ♀, same data. Genitalia slide 6582.

Paratypes 21 ♂, 7 ♀, same locality data, dated iii, iv and vi.1955.

Additional material : 285 ♂♀, same data as type material. These are mostly in damaged condition and have not been used for descriptive purposes.

This species is near *E. intertexta* Bradley, which occurs in the Solomon Is. It may be distinguished from that species by the absence of the light quaker drab and yellow coloration present in *intertexta* in the distal area of the fore wing. The specialized hair-pencil on the upper surface of the hind wing in *capnosticta* is not present in *intertexta*.

Decadarchis eustropha **sp. n.**

(Pl. 14, fig. 18)

♂♀, 10–11 mm. Labial palpus white, second segment marked with fuscous exteriorly to near apex, suffused greyish interiorly, bristles dark brown. Head white or sordid white. Antennal scape white, sometimes an admixture of fuscous below and anteriorly ; flagellum fuscous-black, white-scaled ventrally ; a thin conspicuous white anterior line composed of a chain of very slender white scales. Thorax and tegula white overlaid with a mixture of mummy brown and fuscous, darker towards posterior of thorax and base of tegula. Fore wing with apex upturned ; white ; markings blackish mummy brown ; a small dense patch at base of costa extending along anterior edge to a broad, well-defined, solid, transverse fascia from between 1/4 to near middle ; dorsal half of wing proximad to this fascia diffusely irrorate with fuscous ; an inwardly-oblique, diffuse, ill-defined fascia at about 2/3 dilated distally and occupying most of apical half, inner edge diffusely irrorate more or less straight from costa at about 3/4 to near middle of inner margin (dorsum) where it converges with the prominent submedial fascia ; an intense subapical spot ; cilia white irregularly irrorate with fuscous, a blackish mummy brown basal line around apex. Hind wing whitish grey ; cilia paler. Legs whitish, tarsi marked with blackish fuscous exteriorly.

Male genitalia : Pl. 27, figs. 1 and 2.

Female genitalia : Pl. 26, figs. 4 and 5.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, v.1955 (*L. E. Cheesman*). Genitalia slide 6535.

Allotype ♀, same locality data, dated vi.1955. Genitalia slide 6581.

Paratypes 3 ♀, same locality data, dated iv, v and vi.1955.

Near *D. discreta* Meyrick, which occurs from the Solomon Is. south-west to New Guinea, and distinguished by its smaller size, *discreta* having a wing expanse of 16–21 mm., and also by the well-defined directly transverse fascia on the fore wing at 1/3, which in *discreta* is slightly outwardly-oblique, dilated at inner margin of wing, and connected medially to the distal fascia.

Decadarchis heterogramma Meyrick

Decadarchis heterogramma Meyrick, 1921, *Exot. Microlep.* **2** : 459.

ANEITYUM : Red Crest, 1,200 ft., iv and vi.1955, 1 ♂, 3 ♀.
DISTRIBUTION. Fiji.

Decadarchis flavistriata (Walsingham)

Ereunetis flavistriata Walsingham, 1907, *Fauna Hawaiiensis*, **1** pt. 5 : 716.
Decadarchis euophthalma Meyrick, 1924, *Exot. Microlep.* **3** : 83.

ANEITYUM : Red Crest, 1,200 ft., iv.1955, 1 ♂.
DISTRIBUTION. Hawaiian Is., Solomon Is., Java, Malaya, Fiji, Marquesas, New Hebrides and Kermadec Is.

***Decadarchis synclera* sp. n.**

(Pl. 14, fig. 19)

♂, 16 mm. Labial palpus whitish, irrorated fuscous or fuscous-black exteriorly, beneath with long rough whitish hair-scales throughout, bristles dark brown. Head, thorax and tegula white, crown of head tinged light buff, base of thorax overlaid with fuscous or fuscous-black. Antenna whitish ; scape diffusely irrorate fuscous ; flagellum with weak greyish suffusion. Fore wing ochreous-white ; a thick irregular diffuse fuscous-black streak from base of costa above middle to 2/3, lower edge biundulate ; costal area above streak suffused fuscous ; an elongate fuscous-black spot on costa at 3/4 ; a diffuse fuscous-black medial streak from end of cell to apex ; some light fuscous speckling on dorsal and distal areas ; a conspicuous small black apical spot ; a well-defined fuscous-black marginal line from costa well before apex skirting apical spot and along termen ; cilia ochreous-white, fuscous opposite apical spot. Hind wing greyish white ; cilia concolorous.

Male genitalia : Pl. 27, figs. 3 and 4.

Holotype ♂, NEW HEBRIDES : Aneityum, Red Crest, 1,200 ft., 3 m. NE. of Anelgauhat, iv.1955 (*L. E. Cheesman*). Genitalia slide 6525.

Paratype 1 ♂, same locality data, dated iii.1955.

Very closely related to *D. ancostyla* Meyrick, which occurs in Samoa. The superficial differences between these two species are slight and difficult to elucidate because of the poor condition of the material examined, but the fore wing markings of the Samoan species are heavier. The differences in the male genitalia are also small, in *ancostyla* the ventral part of the valva is pointed at apex not rounded as in *synclera*, and the saccus is similarly tapered to a point and not rounded ; and the dense, compact, cylindrical patch of cornuti are weaker and less sclerotized in *synclera*.

Decadarchis capnographa Meyrick

Decadarchis capnographa Meyrick, 1928, *Exot. Microlep.* **3** : 402.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 2 ♂, 9 ♀.
DISTRIBUTION. New Hebrides.

Decadarchis semifusca Bradley

Decadarchis semifusca Bradley, 1961, *Bull. Brit. Mus.* (*nat. Hist.*), *Ent.* **10** : 165.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 1 ♂, 10 ♀.
DISTRIBUTION. Ontong Java Atoll (Solomons Group).

TINEIDAE

Gerontha captiosella Walker

Gerontha captiosella Walker, 1864, *List Lep. Ins. B.M.* **29** : 782.

ANEITYUM : Red Crest, 1,200 ft., iii–vi.1955, 6 ♀.
DISTRIBUTION. Occurring throughout the Indo-Australian region.

Tinea sp.

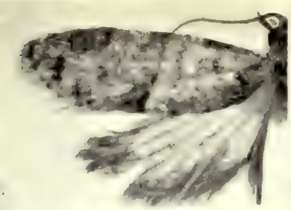
ANEITYUM : Red Crest, 1,200 ft., iii and vi.1955, 2 ♂, 1 ♀.

These three specimens represent a species of unusual appearance but with typical male genitalia of the genus. All are in poor condition and have labial palpi and antennae damaged, and are therefore not considered suitable for descriptive purposes.

BRITISH MUSEUM NATURAL HISTORY

PLATE 14

		Wing expanse of species (mm.)
Fig. 1.	*Nesoscopa psarodes* sp. n., holotype ♂	11–13
Fig. 2.	*Eucosma euryochra* sp. n., holotype ♂	15–19
Fig. 3.	*Strepsicrates poliophora* sp. n., holotype ♂	18
Fig. 4.	*Mesocallyntera dascia* sp. n., holotype ♂	24–27
Fig. 5.	*Cryptophlebia iridoschema* sp. n., holotype ♀	15
Fig. 6.	*Schoenotenes elaphrodes* sp. n., holotype ♂	15
Fig. 7.	*Idiophantis lomatographa* sp. n., holotype ♀	14
Fig. 8.	*Autosticha silacea* sp. n., allotype ♀	12–14
Fig. 9.	*Peragrarchis minima* sp. n., allotype ♀	14–15
Fig. 10.	*Meridarchis celidophora* sp. n., holotype ♀	18–22
Fig. 11.	*Heterogymna cheesmanae* sp. n., holotype ♂	♂30–32 ♀36–40
Fig. 12.	*Imma ochrophara* sp. n., holotype ♂	19
Fig. 13.	*Imma oxystoma* sp. n., holotype ♂	15–17
Fig. 14.	*Yponomeuta meracula* sp. n., holotype ♂	21–24
Fig. 15.	*Anticrates difflua hebridensis* ssp. n., holotype ♂	15–16
Fig. 16.	*Orthenches delosticha* sp. n., holotype ♂	11
Fig. 17.	*Ereunetis capnosticta* sp. n., holotype ♂	10–11
Fig. 18.	*Decadarchis eustropha* sp. n., allotype ♀	10–11
Fig. 19.	*Decadarchis synclera* sp. n., holotype ♂	16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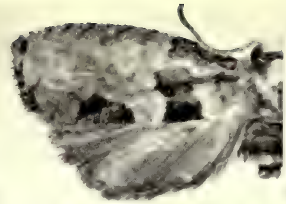
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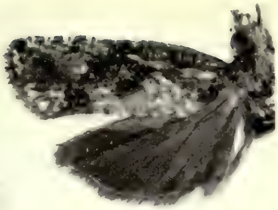
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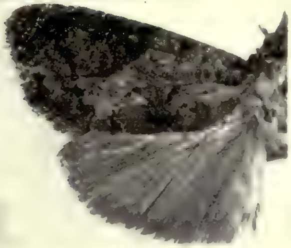
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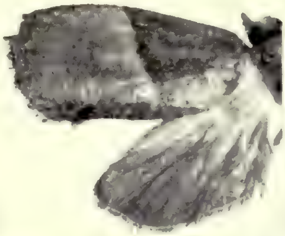
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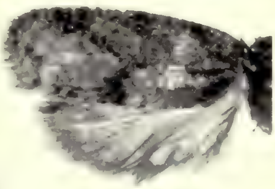
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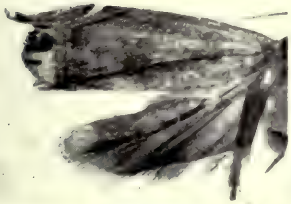
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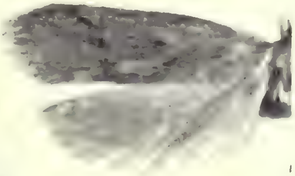
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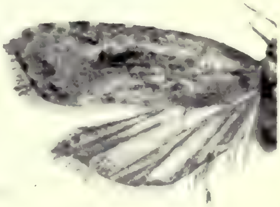
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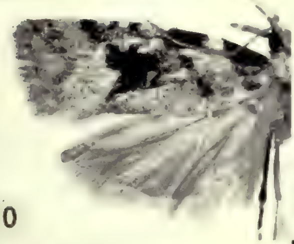
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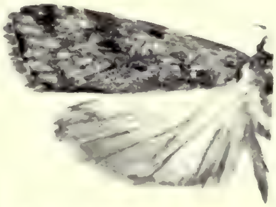
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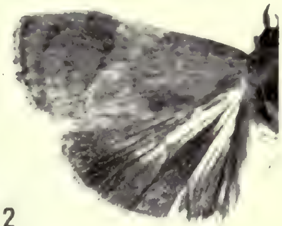
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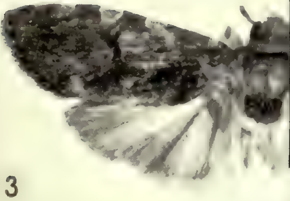
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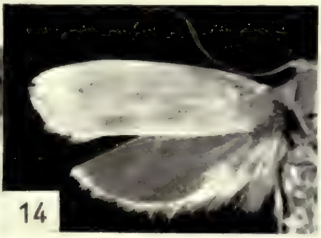
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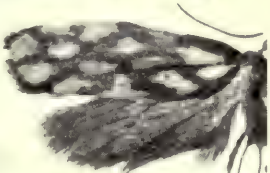
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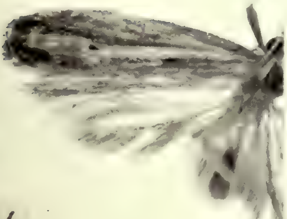
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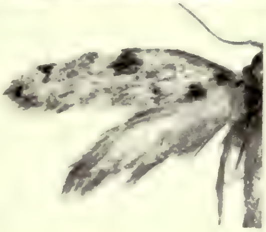
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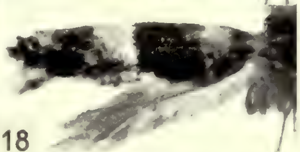
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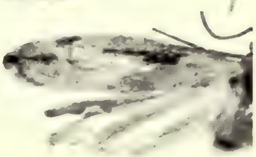
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PLATE 15

FIG. 1. *Neoscopa psarodes* sp. n., ♀ genitalia, ventral view (Slide 5526).
FIG. 2. *Ibidem*, ♂ genitalia with aedeagus removed, ventral view (Slide 5515).
FIG. 3. *Ibidem*, aedeagus, lateral view.
FIG. 4. *Eucosma euryochra* sp. n., ♂ genitalia with aedeagus *in situ*, ventral view (Slide 4846).

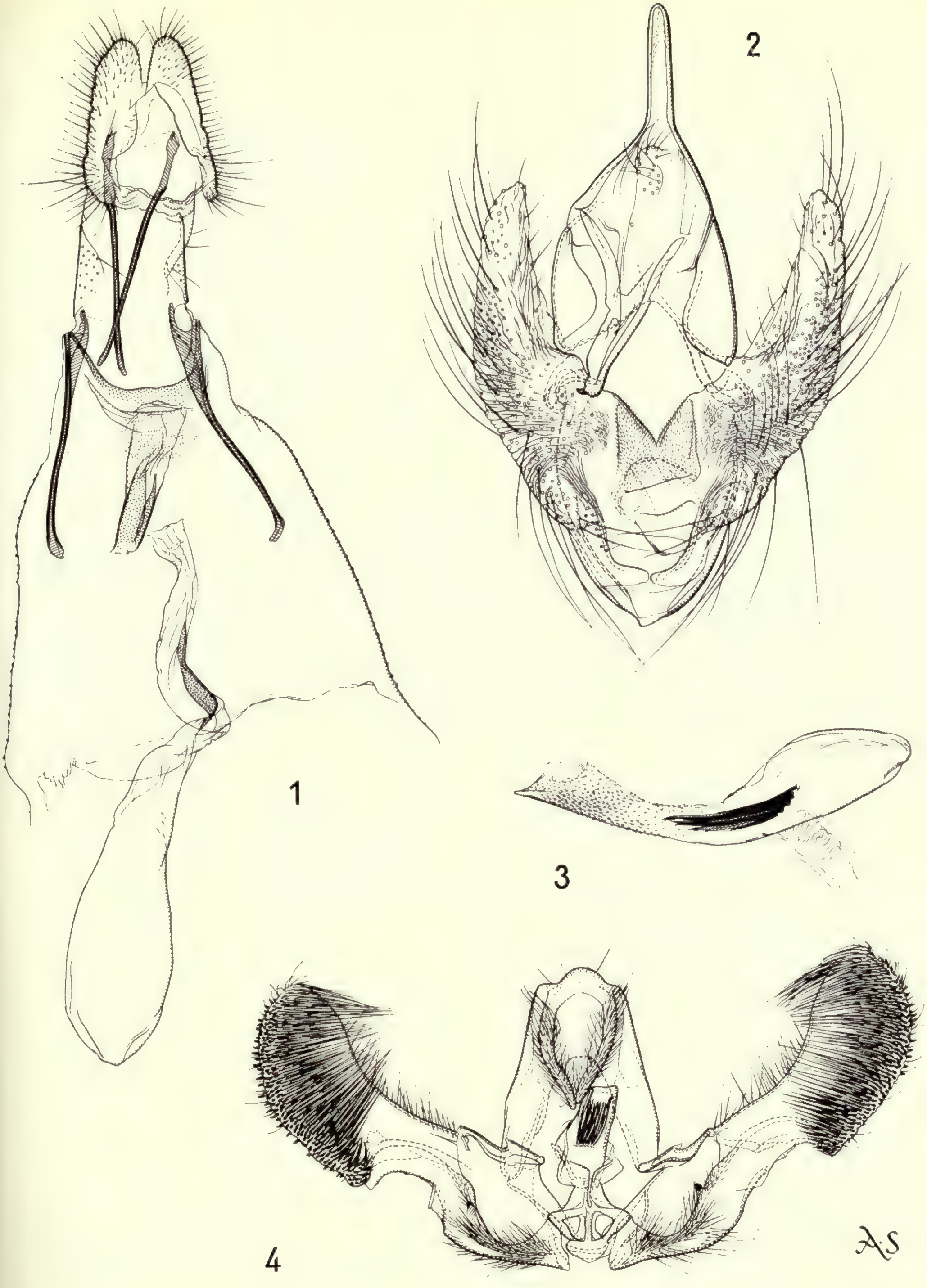
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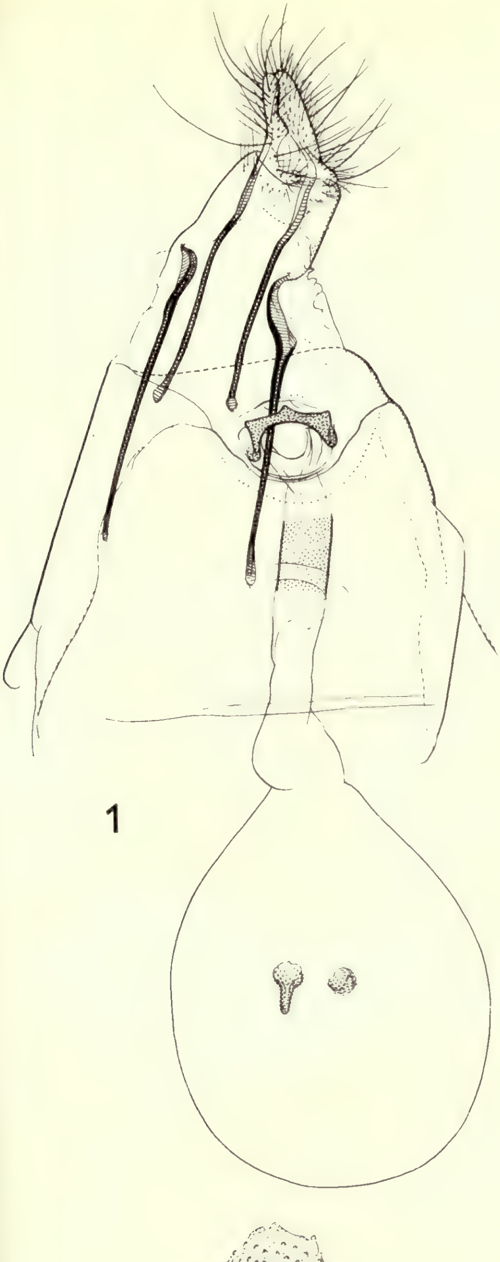
PLATE 16

FIG. 1. *Eucosma euryochra* sp. n., ♀ genitalia, ventral view (Slide 5525).
FIG. 2. *Ibidem,* ostium.
FIG. 3. *Ibidem,* enlargement showing detail of one of the pair of signa.
FIG. 4. *Cryptophlebia iridoschema* sp. n., ♀ genitalia, ventral view (Slide 6051).



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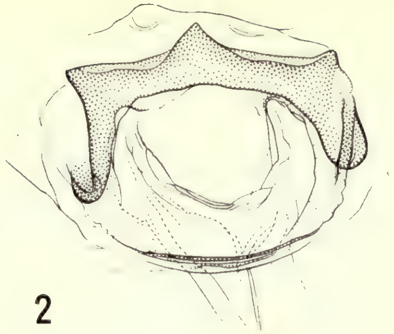

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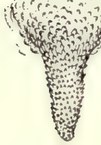

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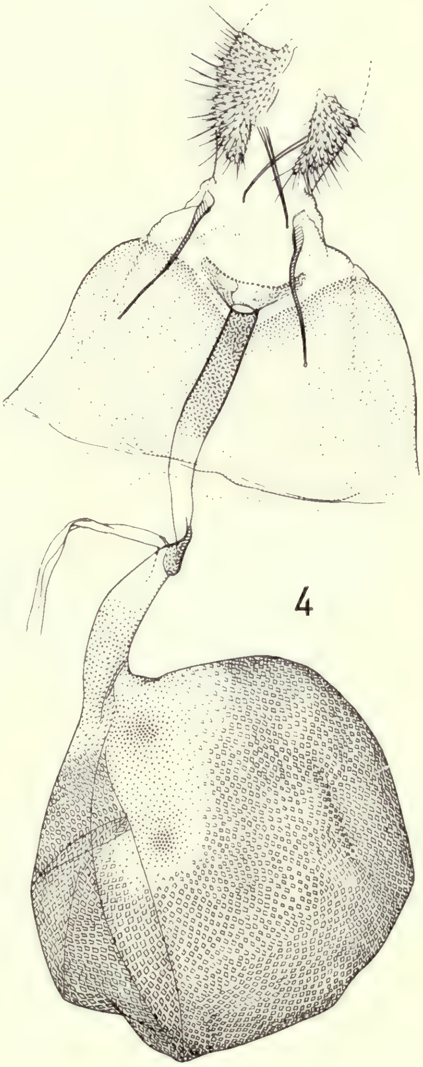

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PLATE 17

FIG. 1. *Strepsicrates poliophora* sp. n., ♂ genitalia with aedeagus *in situ*, ventral view (Slide 4883).

FIG. 2. *Autosticha silacea* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 6038).

FIG. 3. *Ibidem*, aedeagus, lateral view.

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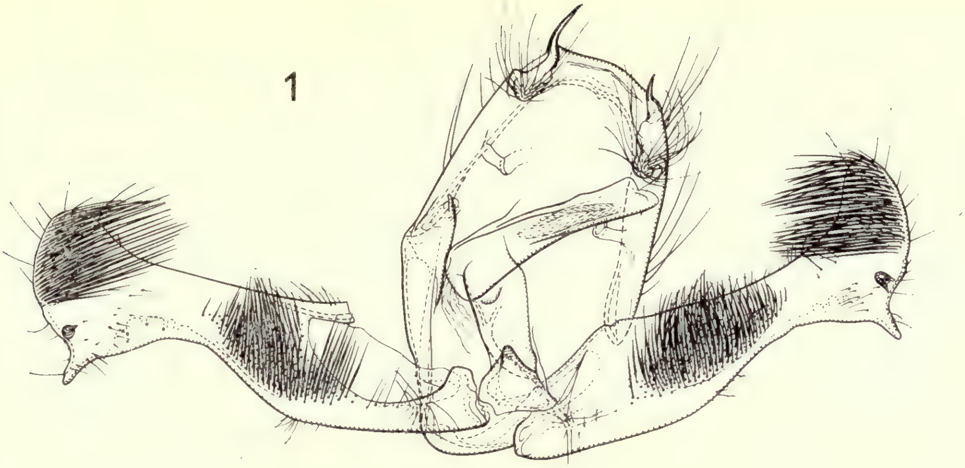

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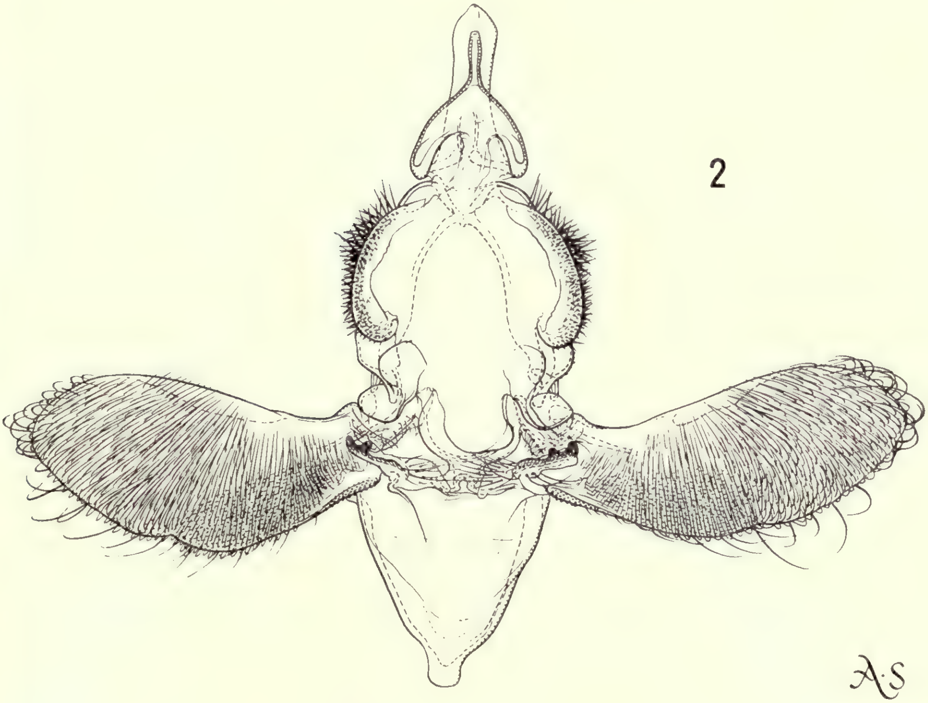

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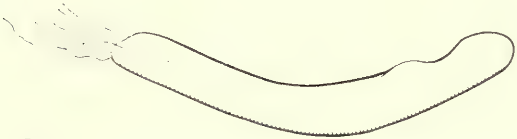

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PLATE 18

FIG. 1. *Mesocallyntera dascia* sp. n., ♂ genitalia with aedeagus *in situ*, ventral view (Slide 6020).

FIG. 2. *Schoenotenes elaphrodes* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 5516).

FIG. 3. *Ibidem*, aedeagus, lateral view.

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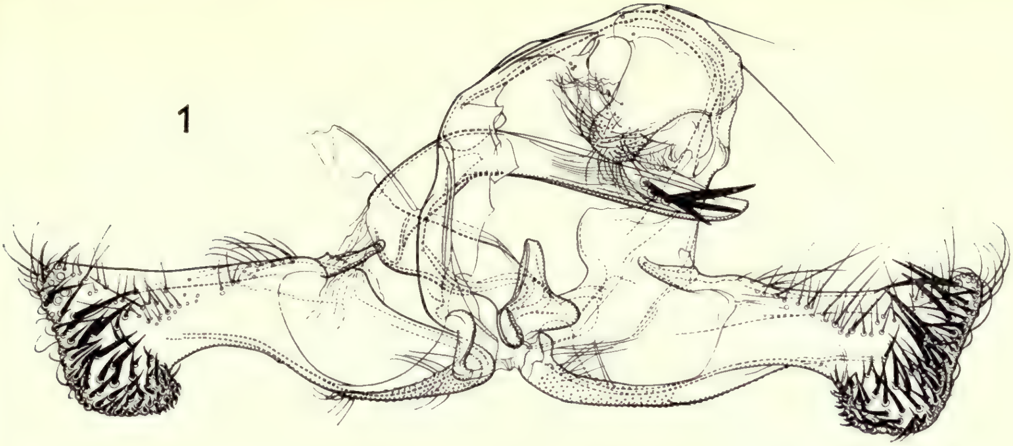

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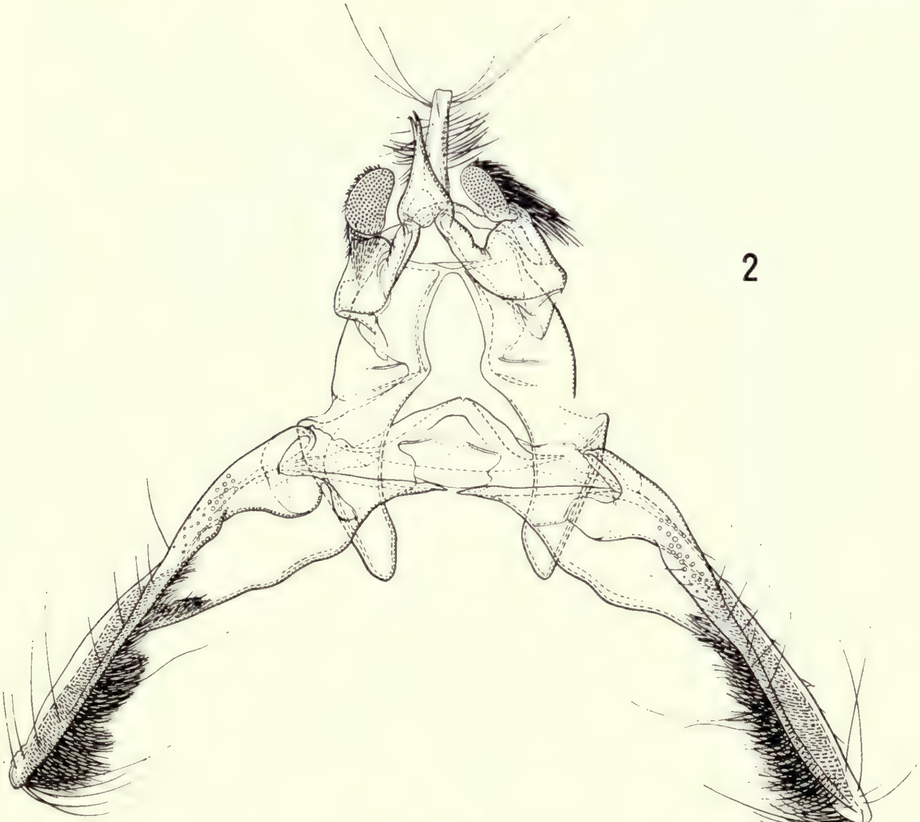

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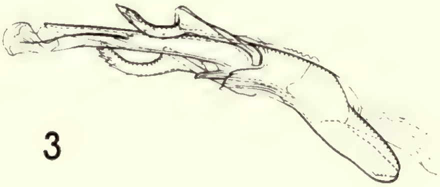
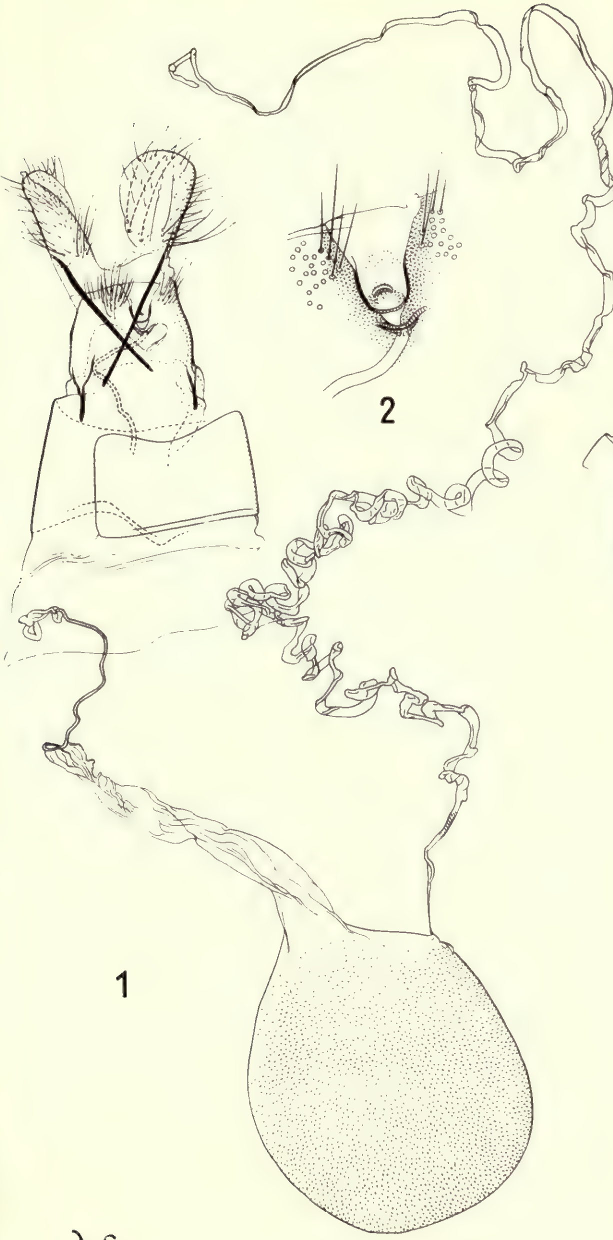


PLATE 19

FIG. 1. *Idiophantis lomatographa* sp. n., ♀ genitalia, ventral view (Slide 6580).

FIG. 2. *Ibidem,* ostium.

FIG. 3. *Meridarchis celidophora* sp. n., ♀ genitalia, ventral view (Slide 6054).



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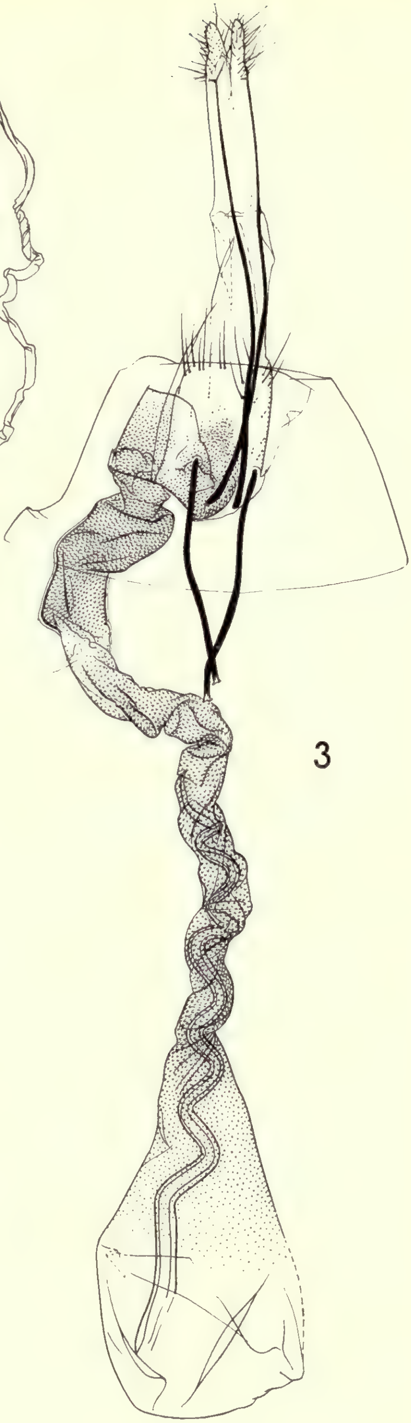

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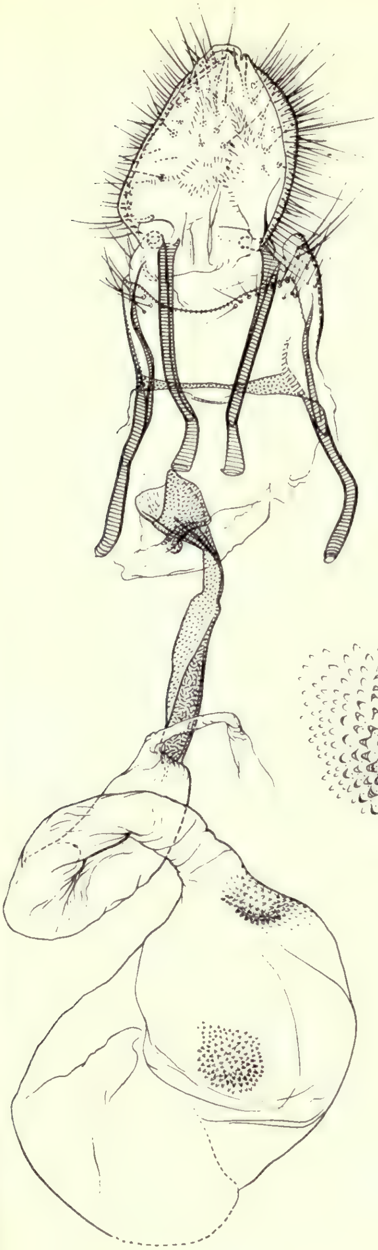
PLATE 20

Fig. 1. *Autosticha silacea* sp. n., ♀ genitalia, ventral view (Slide 6577).
Fig. 2. *Ibidem*, enlargement showing detail of one of the pair of signa.
Fig. 3. *Heterogymna cheesmanae* sp. n., ♀ genitalia, ventral view (Slide 4828).
Fig. 4. *Ibidem*, enlargement showing detail of one of the pair of signa.



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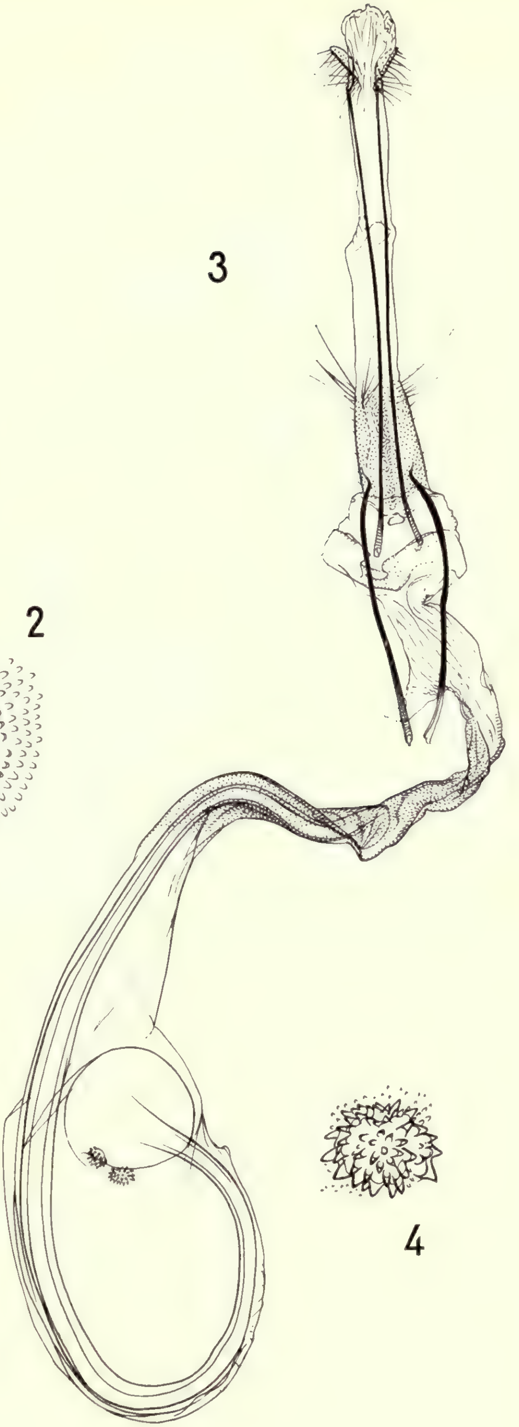

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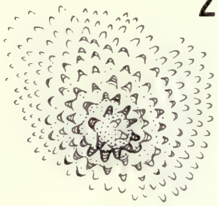

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PLATE 21

Fig. 1. *Peragrarchis minima* sp. n., ♀ genitalia, ventral view (Slide 6055).
Fig. 2. *Ibidem,* ostium.
Fig. 3. *Ibidem,* signum.

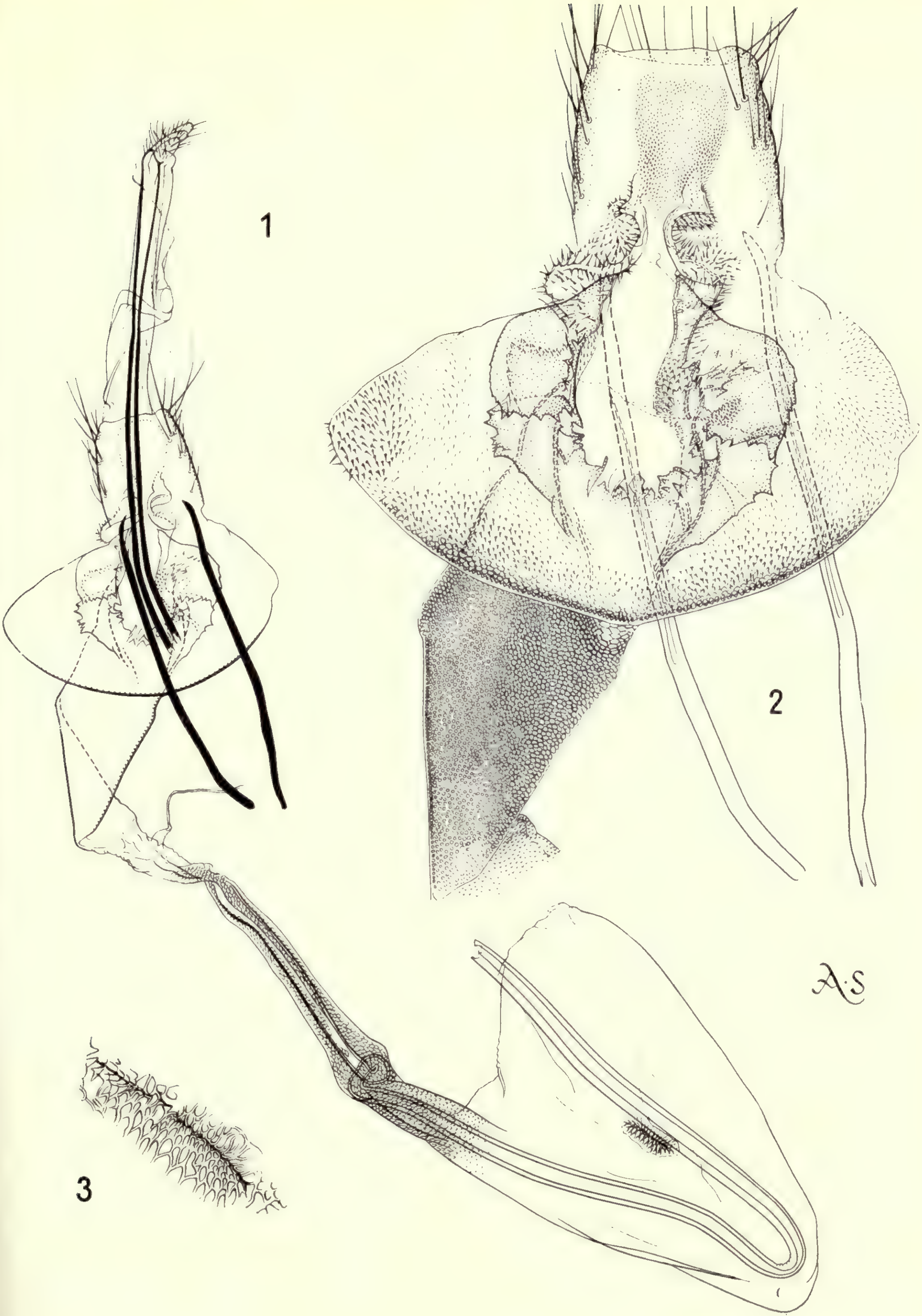
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PLATE 22

FIG. 1. *Peragrarchis minima* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 6029).

FIG. 2. *Ibidem*, aedeagus, lateral view.

FIG. 3. *Heterogymna cheesmanae* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 4890).

FIG. 4. *Ibidem*, aedeagus, lateral view.

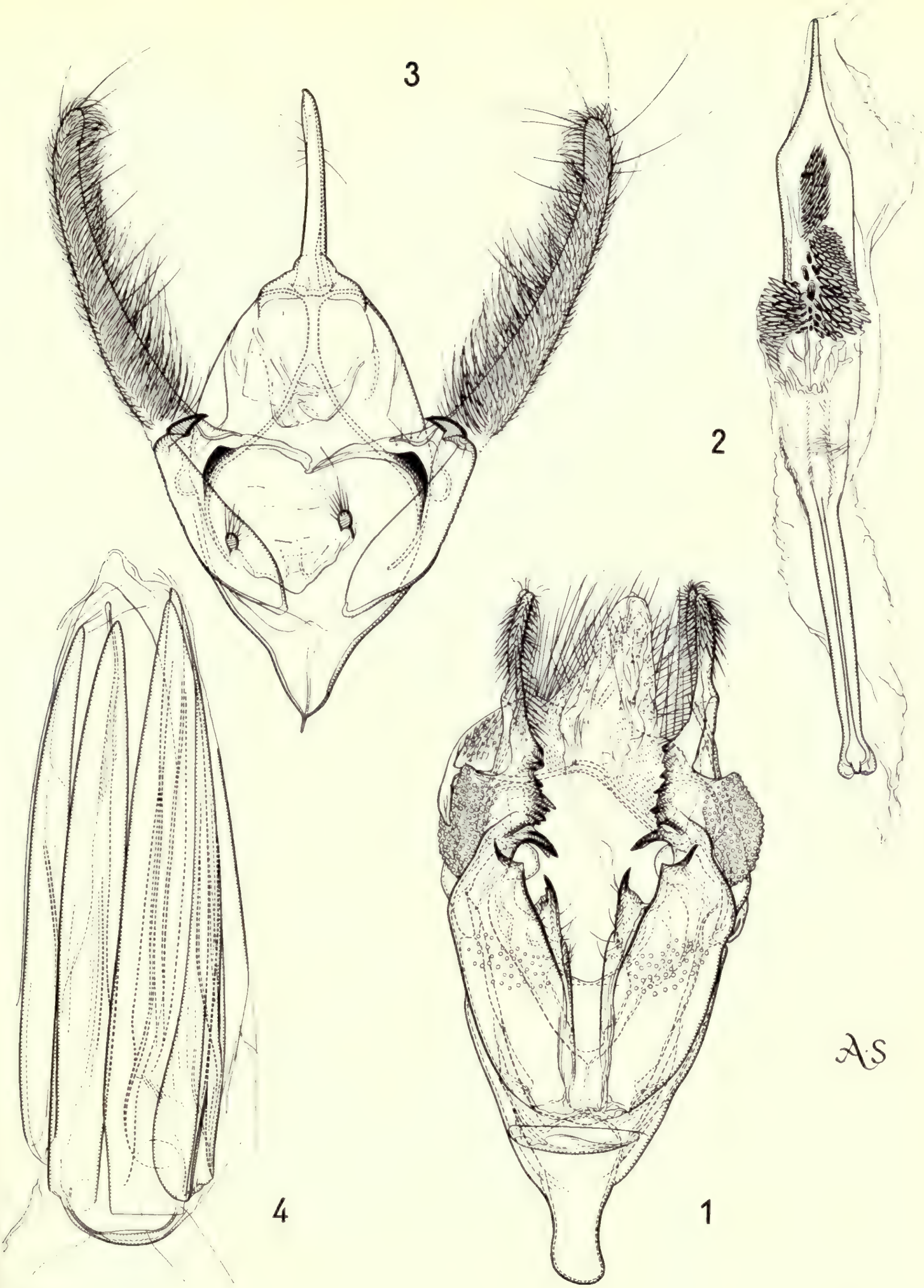
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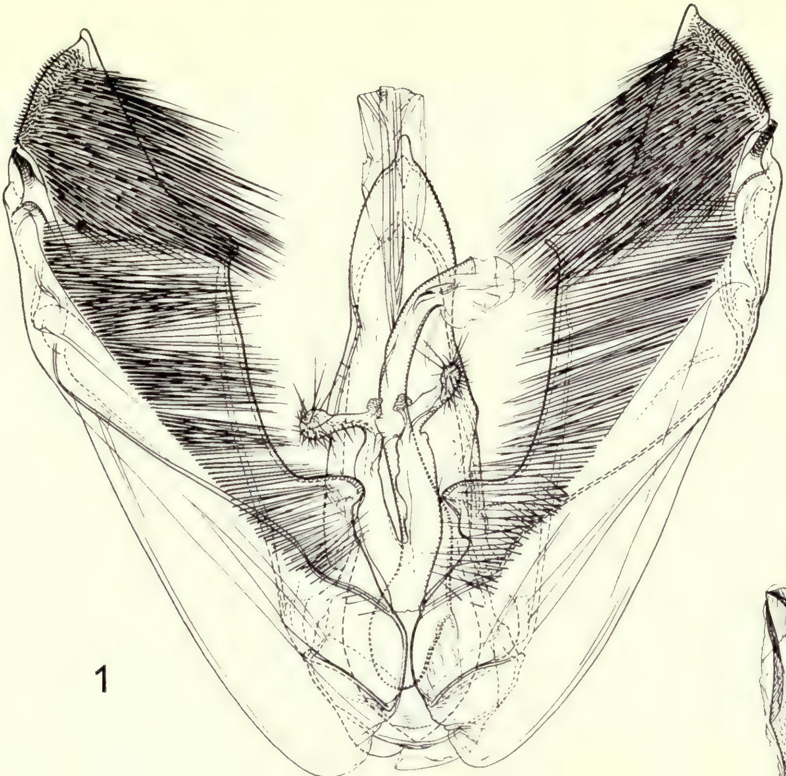
PLATE 23

FIG. 1. *Imma ochrophara* sp. n., ♂ genitalia with aedeagus *in situ*, ventral view (Slide 6040).

FIG. 2. *Imma oxystoma* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 4884).

FIG. 3. *Ibidem*, aedeagus, lateral view.



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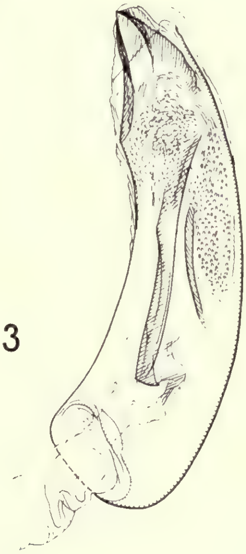

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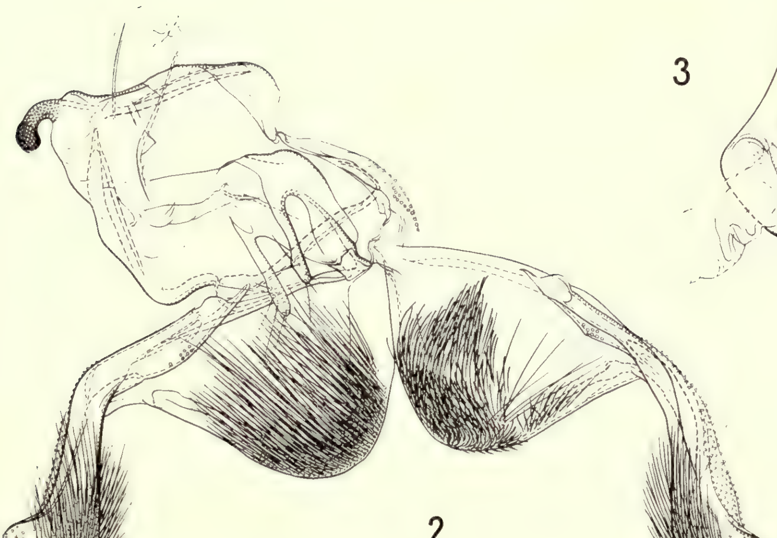

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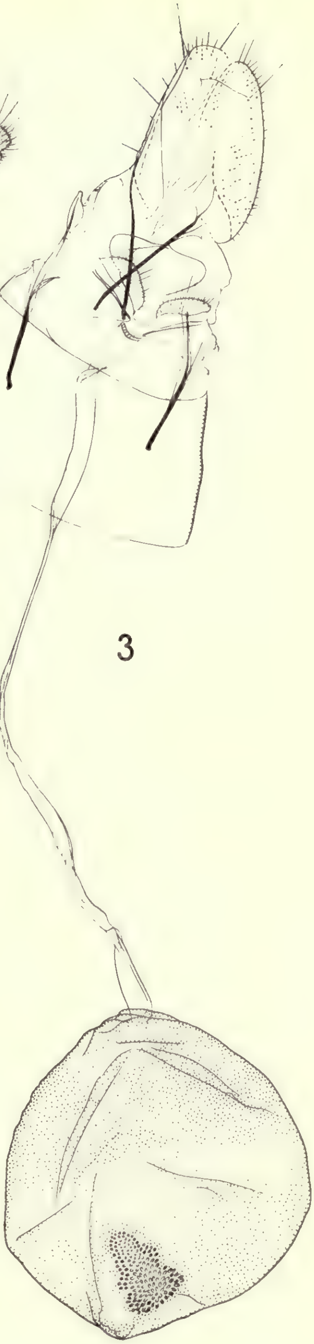
PLATE 24

FIG. 1. *Imma oxystoma* sp. n., ♀ genitalia, ventral view (Slide 4875).
FIG. 2. *Ibidem,* signum.
FIG. 3. *Yponomeuta meracula* sp. n., ♀ genitalia, ventral view (Slide 4873).
FIG. 4. *Ibidem,* signum.
FIG. 5. *Ibidem,* ostium.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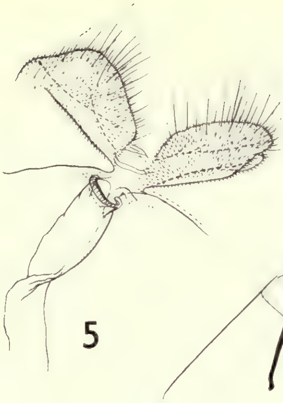
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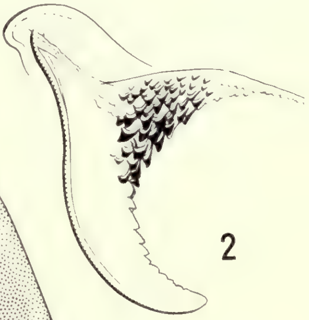
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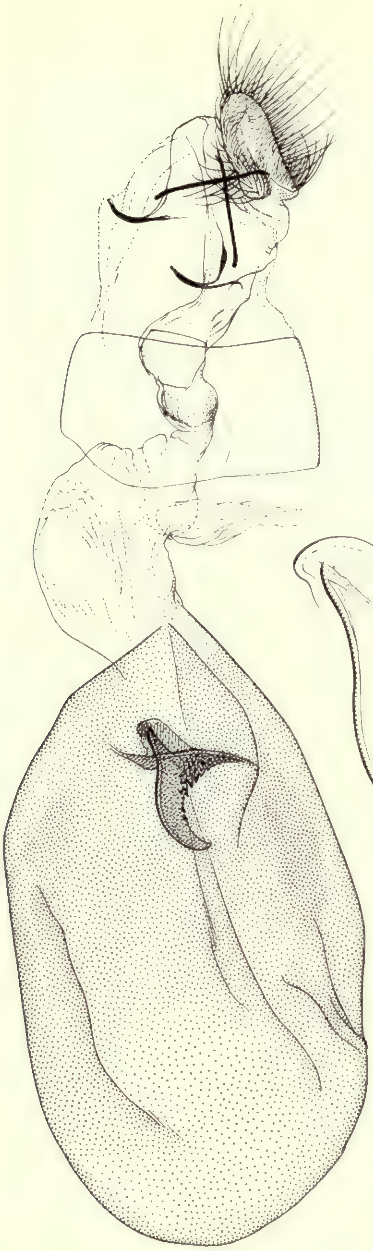
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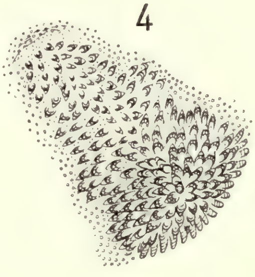
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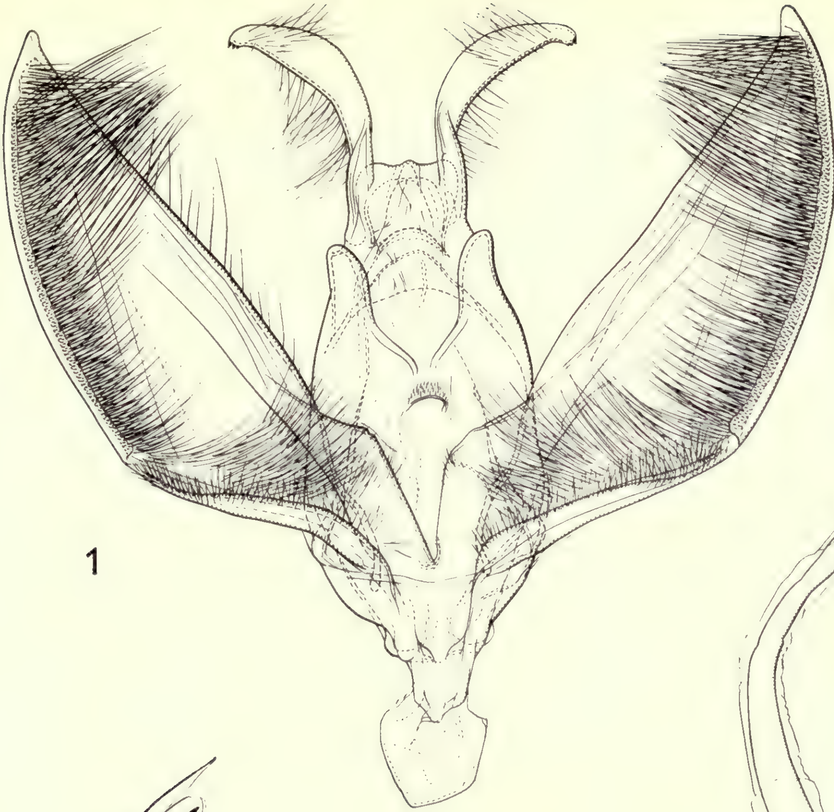
PLATE 25

FIG. 1. *Yponomeuta meracula* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 4905).

FIG. 2. *Ibidem*, aedeagus, lateral view.

FIG. 3. *Orthenches delosticha* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 6534).

FIG. 4. *Ibidem*, aedeagus, lateral view.



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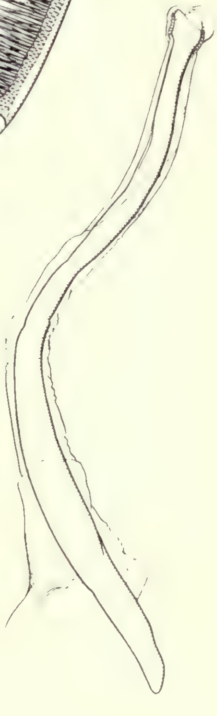

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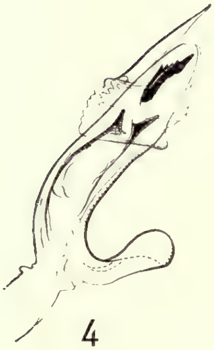

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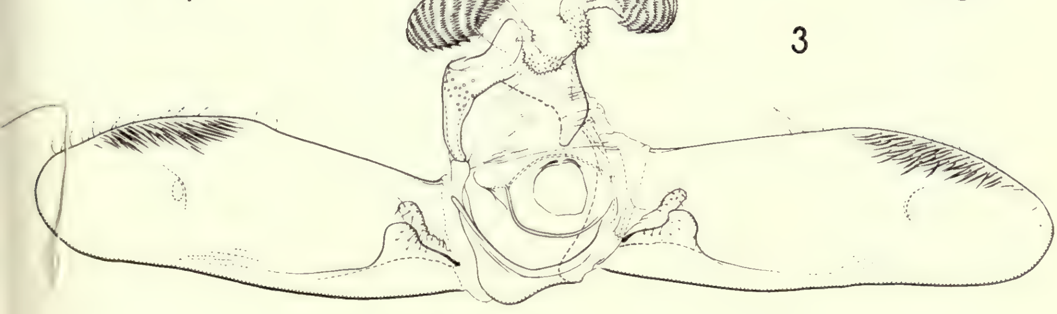

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PLATE 26

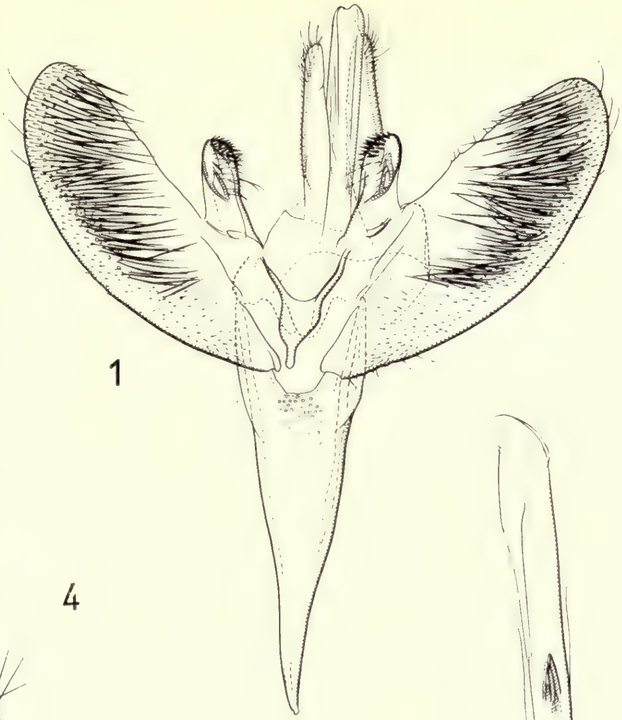
FIG. 1. *Ereunetis capnosticta* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 6537).

FIG. 2. *Ibidem*, aedeagus, lateral view.

FIG. 3. *Ibidem*, ♀ genitalia, ventral view (Slide 6582).

FIG. 4. *Decadarchis eustropha* sp. n., ♀ genitalia, excluding bursa copulatrix and portion of ductus bursae, ventral view (Slide 6581).

FIG. 5. *Ibidem*, bursa copulatrix and portion of ductus bursae.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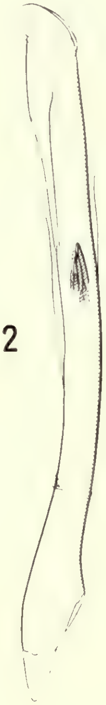
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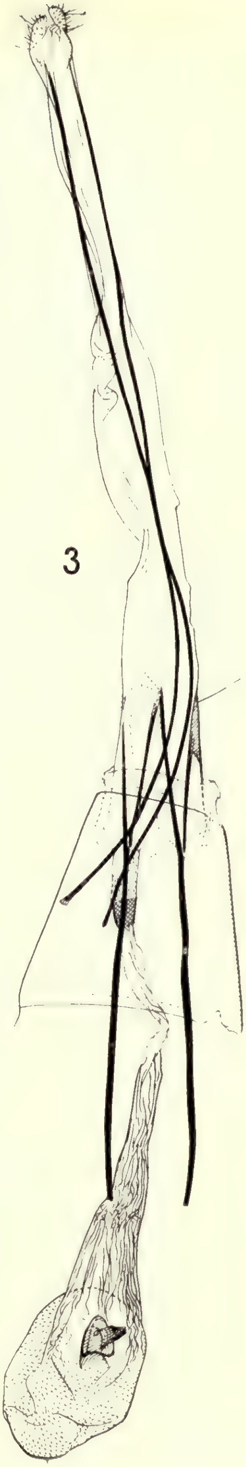
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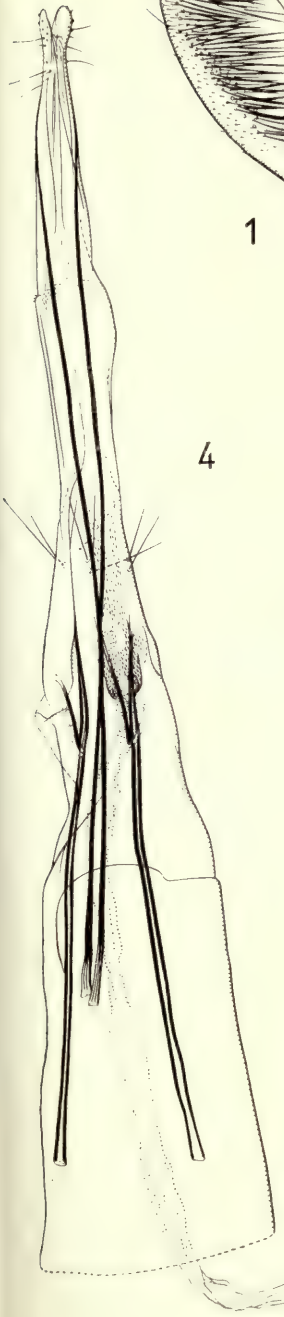
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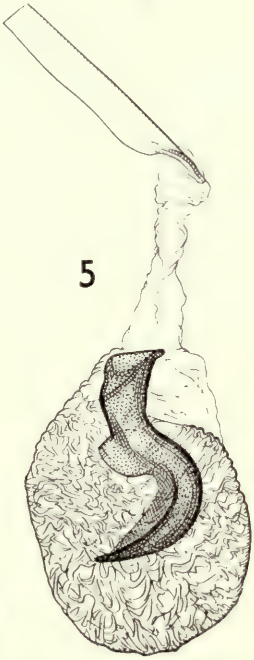
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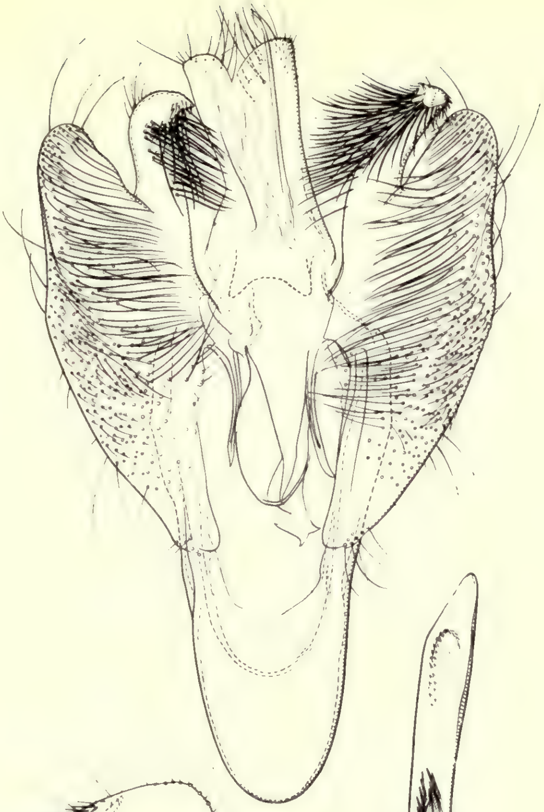
PLATE 27

Fig. 1. *Decadarchis eustropha* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 6535).

Fig. 2. *Ibidem*, aedeagus, lateral view.

Fig. 3. *Decadarchis synclera* sp. n., ♂ genitalia with aedeagus removed, ventral view (Slide 6525).

Fig. 4. *Ibidem*, aedeagus, lateral view.



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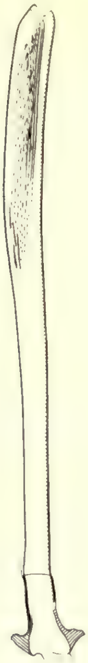

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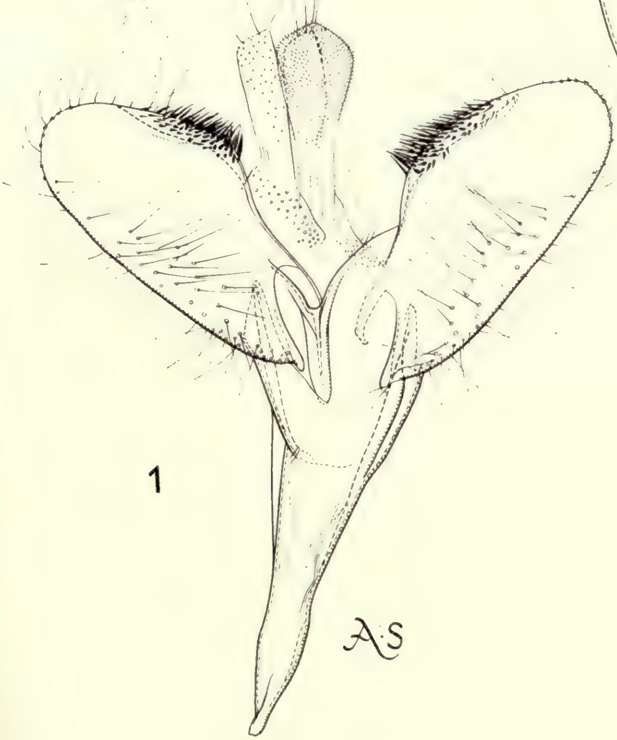

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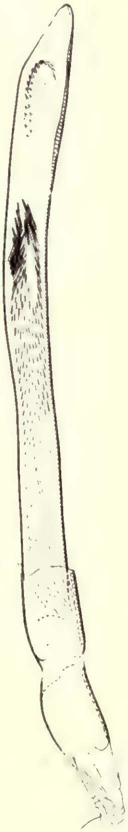

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THE ACRIDOIDEA (ORTHOPTERA) OF MADAGASCAR

I. ACRIDIDAE (EXCEPT ACRIDINAE)

V. M. DIRSH

BRITISH MUSEUM
23 JUL 1962
NATURAL HISTORY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 12 No. 6
LONDON: 1962

THE ACRIDOIDEA (ORTHOPTERA) OF MADAGASCAR

I. ACRIDIDAE (EXCEPT ACRIDINAE)

BY
V. M. DIRSH
Anti-Locust Research Centre, London

BRITISH MUSEUM
13 JUL 1962
NATURAL HISTORY

Pp. 273–350 ; 40 *Text-figures*

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THE BRITISH MUSEUM (NATURAL HISTORY)
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THE ACRIDOIDEA (ORTHOPTERA) OF MADAGASCAR

I. ACRIDIDAE (EXCEPT ACRIDINAE)

By V. M. DIRSH

SYNOPSIS

The subfamilies Hemiacridinae, Oxyinae, Coptacridinae, Calliptaminae, Eyprepocnemidinae, Catantopinae and Cyrtacanthacridinae of the family Acrididae (Acridoidea, Orthoptera) of Madagascar are revised. Eleven new genera and nineteen new species are described. Some inadequately described genera and species are redescribed and synonymy is checked. Interrelations between species and genera are briefly discussed.

INTRODUCTION

In 1956 Dr. R. Paulian, Directeur-adjoint de l'Institut de Recherche Scientifique de Madagascar (at present Directeur de l'Institut d'Etudes Centre-africaines) invited me to study the Acridoidea of Madagascar. This offer was gratefully accepted and the present paper is the first of the preliminary studies which are essential before a full review of the Madagascar fauna can be undertaken.

This part deals with representatives of subfamilies of the Acrididae, other than Acridinae, so far found in Madagascar. The Acridinae and other families of Acridoidea will form the subject of further studies when more material has been accumulated.

The material so far studied suggests that probably less than half the genera and species of Madagascar Acridoidea are known. The fauna of the island is extremely peculiar. It contains some African elements, which probably reached Madagascar relatively recently, but most of it consists of purely endemic genera and species. From the taxonomic point of view many of the genera are so peculiar that they are difficult to place definitely into any of the known subfamilies. From the zoogeographical point of view this endemic fauna suggests affinites with the Acridoidea of the Oriental rather than the Ethiopian Region. However, the discussion of this question will have to be postponed for the time being.

Endemic genera and species are redescribed here and many illustrated for the first time.

I wish to express my sincere gratitude to the following persons : Dr. L. Chopard (Paris Museum), Mr. E. Morales-Agacino (Madrid Museum), and Dr. Ch. Ferrière (Geneva Museum), for providing the types, which were essential for the studies in this paper. I am also grateful to Dr. B. P. Uvarov for his valuable advice in the course of preparation of this paper, Dr. T. H. C. Taylor, Director of the Anti-Locust Research Centre, and Mr. J. P. Doncaster, Keeper of the Department of Entomology of the British Museum (Natural History) for the editorial work on the manuscript.

Subfamily **HEMIACRIDINAE**

The Madagascar representatives of this subfamily are of peculiar appearance, sometimes strikingly so. They also exhibit a tendency towards the reduction and even loss of the stridulatory veinlets of the elytron characteristic for the subfamily. Sometimes some of the specimens of the same species have clearly detectable, though reduced, stridulatory veinlets, while others have lost them completely or almost completely.

The same instability of subfamily characters was observed in the structure of the penis. While some of the species have clearly disconnected basal and apical penis valves, typical for the subfamily, others have a tendency to form a thin flexure, which sometimes, although thin, is rather strongly sclerotized, and in one case is rather thick and robust.

This makes the Hemiacridinae of Madagascar somewhat isolated from other members of the subfamily. It is not clear whether they are losing the characteristic features of the subfamily or gaining them.

Although the majority of genera in the subfamily are apparently not closely related, some of them show affinities definite enough to allow their formation into groups (e.g. *Euthymia* Group, *Gergis* Group). Much further study is needed to establish the taxonomic value of these groups and their interrelationship with other genera.

KEY TO GENERA

1 (2) Antenna compressed, slightly ensiform. Male subgenital plate as long or longer than pronotum (Text-fig. 1) . . . . . ***LEPTACRIS*** (p. 277)

2 (1) Antenna filiform or widened in basal part, but not compressed, male subgenital plate much shorter than pronotum.

3 (12) Elytra lobiform, lateral, vestigial or absent.

4 (9) Elytra lobiform, lateral.

5 (8) Dorsum of pronotum smooth, without convexities.

6 (7) Posterior margin of pronotum excurved (Text-fig. 2) ***SPATHOSTERNUM*** (p. 278)

7 (6) Posterior margin of pronotum incurved (Text-fig. 3) ***PARASPATHOSTERNUM*** (p. 279)

8 (5) Dorsum of pronotum rugose with large convexities (Text-fig. 4) ***PSEUDOSERPUSIA*** (p. 281)

9 (4) Elytra vestigial or absent.

10 (11) Fully apterous. Antenna filiform (Text-fig. 6) . . . . ***HYSIELLA*** (p. 284)

11 (10) Male with vestigial elytra, female apterous. Antenna widened in basal part (Text-fig. 13) . . . . ***XENIPPOIDES*** (p. 298)

12 (3) Elytra fully developed or shortened, but not lobiform.

13 (24) Cubital vein of hind wing not connected with medial.

14 (15) Head strongly prognathous. Whole body covered with long hair, its lower surface concave. Prosternum without process, with collar-like projecting anterior margin (Text-fig. 5) . . . . . . ***PAULIANACRIS*** (p. 282)

15 (14) Head orthognathous or opisthognathous or slightly prognathous. Body only slightly hairy or not hairy, its lower surface not concave. Prosternum with process, without collar.

16 (17) Body strongly elongated, slender. Head acutely conical, opisthognathous; fastigium of vertex strongly elongated, narrow (Text-fig. 12) ***GALIDEUS*** (p. 296)

17 (16) Body moderately elongated and not slender. Head subconical to subglobular, orthognathous or slightly prognathous. Fastigium of vertex short, wide.

18 (23) Pronotum cylindrical or subcylindrical without convexities.

19 (20) Pronotum subcylindrical ; transverse sulci comparatively wide ; integument slightly rugose (Text-figs. 7, 8) . . . . . . ***ONETES*** (p. 284)

20 (19) Pronotum cylindrical ; transverse sulci fine ; integument smooth.

21 (22) Male supra-anal plate elongate, with acutangular apex (Text-fig. 9) ***EUTHYMIA*** (p. 290)

22 (21) Male supra-anal plate short, wide, with obtusangular apex (Text-fig. 10) ***PROEUTHYMIA*** (p. 293)

23 (18) Pronotum tectiform, with tubercle-like projections (Text-fig. 11) ***LOPHEUTHYMIA*** (p. 294)

24 (13) Cubital vein of hind wing connected with medial (Text-fig. 18).

25 (26) Antenna short, widened in basal part and slightly club-like, thickened at apex (Text-fig. 17) . . . . ***PACHYCERACRIS*** (p. 305)

26 (25) Antenna long, filiform on whole length.

27 (30) Precostal and vannal areas of elytra without regular, parallel, transverse, oblique veinlets.

28 (29) External apical spine of hind tibia present. Stridulatory veinlets of radial area of elytra reduced (Text-fig. 14) . . ***MALAGASACRIS*** (p. 300)

29 (28) External apical spine of hind tibia absent. Stridulatory veinlets of radial area of elytra greatly reduced or absent (Text-figs. 15, 16) . ***GERGIS*** (p. 302)

30 (27) Precostal and vannal areas of elytra with regular, parallel, transverse, oblique veinlets (Text-fig. 18) . . . . . . ***MORONDAVIA*** (p. 306)

LEPTACRIS Walker, 1870

Leptacris Walker, 1870 : 676.
Ischinacrida Stål, 1873 : 53 ; Uvarov, 1944 : 18.
Metapa Stål, 1878 : 51, 97 ; Dirsh, 1958 : 239.
Rhamphacrida Karsch, 1893 : 112 ; Dirsh, 1958 : 239.
Pretoriana Uvarov, 1922 : 99 ; Uvarov, 1944 : 16.

Leptacris hova (Karsch, 1896)

(Text-fig. 1)

Ischinacrida hova Karsch, 1896 : 289.
Ischinacrida pulchra Karny, 1907 : 300, **syn. n.**
Leptacris hova (Karsch, 1896) ; Uvarov, 1944 : 18.

Both species named above were inadequately described. The only difference which could be found in the descriptions is in the coloration of internal side of hind femur, in *I. hova* being " infuscatis " and in *I. pulchra* " luteo rubra, concolora (♂) vel viridi-coerulea, pallidipunctata (♀) ". In the series of specimens studied the colour of the internal side of hind femur varies from reddish, purplish, bluish and brownish, to brown (which is possibly a post mortem change). Small spots, whitish or pale but of the same colour as background, may be present or absent ; the same colour variability exists in *L. violacea* (Karny, 1907) and *L. monteiroi* (I. Bolivar, 1820). No structural differences between the two synonymized species exist and it may be safely assumed that both belong to the same species.

It should be noted that *L. hova* is very near to the African *L. monteiroi*, the only difference between them being that in *L. monteiroi* the head is slightly shorter than in *L. hova* and *L. hova* has slightly wider antennae. The phallic complex is of exactly the same structure in both of them. It is possible that they represent only subspecies.

Madagascar Centre : Tananarive Tsimbazaza, 17.viii.1947, 1 ♂ (R. Paulian) ; Miarinarivo, viii.1958, 1 ♂ nymph (A. Robinson) ; Tsiraonomandidy, sommet de l'Ambohiby, 26.v.1948, 1 ♀, nymph (R. Paulian) ; Ambatofinandrahana, 1,180 m., 26.vii.1957, 1 ♂ (P. Griveaud).

Madagascar Ouest : VIII^e Réserve Naturelle, Soalala, viii, 1 ♀ (R. Paulian) ; Namoroka, 1 ♂ (Rakotovao) ; forêt de l'Ankarafantsika, Ampijoroa, xii.1951, 1 ♀ (P. Viette).

Madagascar Est : Manakara, 15 km. vers Vohipeno, xi.1957, 1 ♀ (Jean Elie).

SPATHOSTERNUM Krauss, 1877

***Spathosternum malagassum* sp. n.**

(Text-fig. 2)

♂. Type. This species is very near to *Spathosternum curtum* Uvarov, 1953 from Angola, from which it differs by slightly shorter, lobiform elytra, not overlapping on dorsal side and with more reduced and rougher venation, and by better developed and regularly incurved lateral carinae of pronotum. The phallic complex is very similar and differs only in small details, such as the relative size of the valves of penis. Epiphallus rather similar.

♀. Unknown.

Length of body 12·2 ; pronotum 2·3 ; elytron 2·6 ; hind femur 6·2 mm.

Madagascar Centre : Ankazobe, forêt d'Ambohitantely, 26.ii.1948, 1 ♂ type, 2♂ paratypes (R. Paulian).

Type in Paris Museum. One paratype in the British Museum (Natural History).

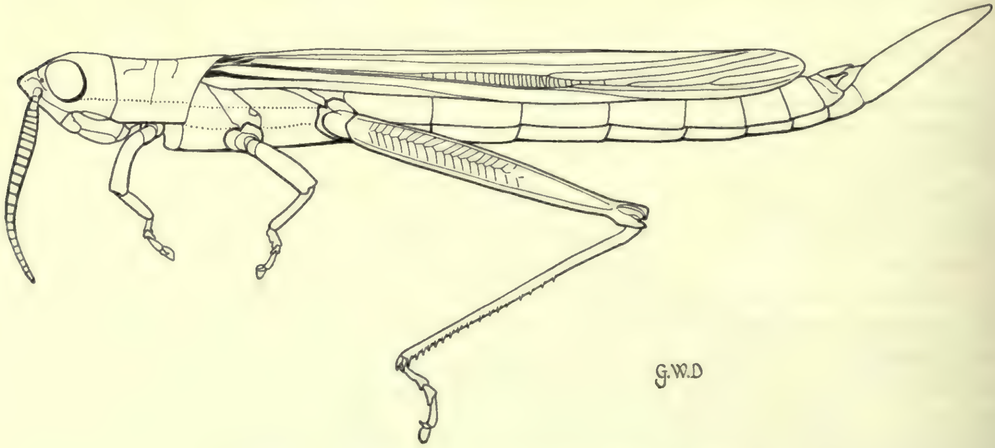

FIG. 1. *Leptacris hova* (Karsch, 1896). Male.

PARASPATHOSTERNUM Ramme, 1929

***Paraspathosternum andringitra* sp. n.**

(Text-fig. 3)

♂. Type. Body of medium size, cylindrical, in female slightly widened in middle. Integument finely rugose and shiny. Antenna twenty-segmented, thick, filiform, shorter than head and pronotum together. Head conical; fastigium of vertex widely angular, short, slightly concave, with obtuse marginal carinulae; interocular distance wider than basal antennal segment; along whole head there is an obtuse median carinula; frons strongly oblique, frontal ridge deeply sulcate, with thick, obtuse lateral carinulae, almost parallel on whole length and at apex fused into narrow ridge. Pronotum sybcylindrical; dorsum flattened, crossed by three sulci; median and lateral carinae poorly developed, obtuse, almost parallel; metazona less than half length of prozona, its posterior margin obtusangularly incurved. Prosternal process spathulate, with deeply bilobate apex; mesosternal interspace longer than its width, slightly constricted in the middle. Elytra lobiform, lateral, with convex surface, reaching middle of second or third abdominal tergite; venation and reticulation thick and rough; apex subacute. Hind femur moderately slender; lower lobe of hind knee rounded; external apical spine of hind tibia present. Arolium large. Male supra-anal plate short, angular. Cercus straight, narrow-conical. Subgenital plate short, subconical. Phallic complex slender. Apodeme horseshoe-shaped; rami narrow; sheath of penis present; basal and apical valves of penis connected by flexure-like thin connection; gonopore processes large; apical valves of penis small; valves of cingulum large, with apical extension; arch of cingulum large. Epiphallus

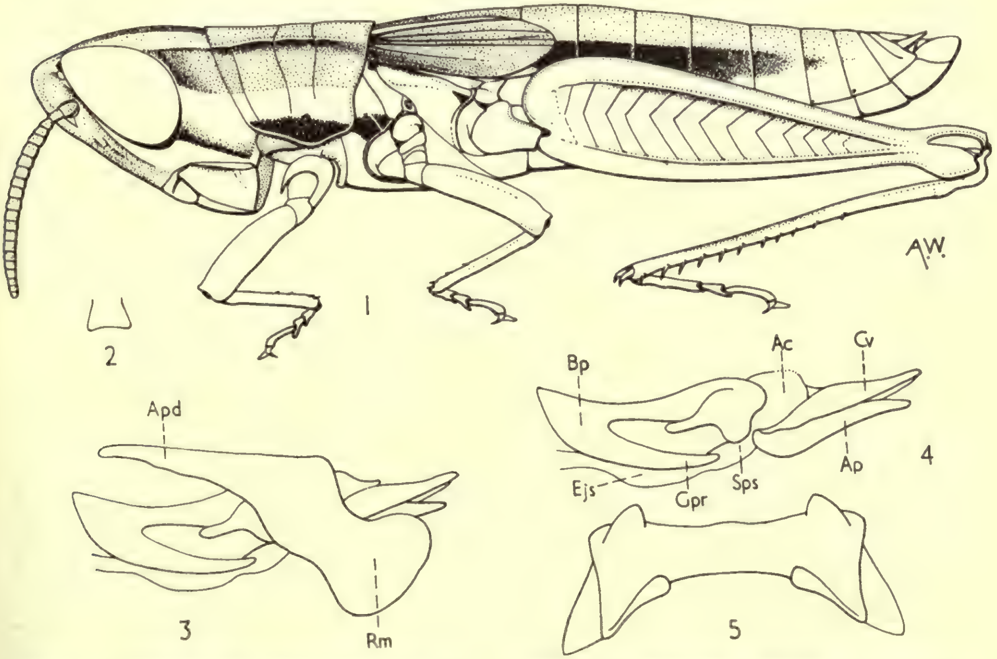

FIG. 2. *Spathosternum malagassum* sp. n. 1, male. 2, prosternal process. 3, phallic complex, with ectophallic membrane and epiphallus removed. 4, the same with most of cingulum removed. 5, epiphallus.

bridge-shaped, with wide bridge, small angular ancorae and moderately large lobiform lophi. General coloration dark brown. Gena behind eye with ochraceous stripe; lower part of gena with another less developed ochraceous stripe; lateral carinae of pronotum and lower part of lateral lobes light brownish; pleura with longitudinal, dirty ochraceous stripe; elytra brown, in basal part light, in apical part dark brown; lower lobe of hind knee ochraceous; hind tibia reddish, with whitish spines, brown at apices.

♀. Paratype, as male, but larger, with more widened middle part of body. Subgenital plate slightly trilobate, with angular middle lobe. Valves of ovipositor slender, with slightly curved apices.

Length of body ♂ 17·2, ♀ 26; pronotum ♂ 3·2, ♀ 5·5; elytron ♂ 4, ♀ 6·6; hind femur ♂ 8·8, ♀ 13 mm.

Madagascar Centre: Ambalavao, Cirque Boby, 2,500 m., Andringitra, i.1958, 1 ♂ type, 2 ♀ paratypes (R. Paulian). Type and paratype in Paris Museum. One female paratype in the British Museum (Natural History).

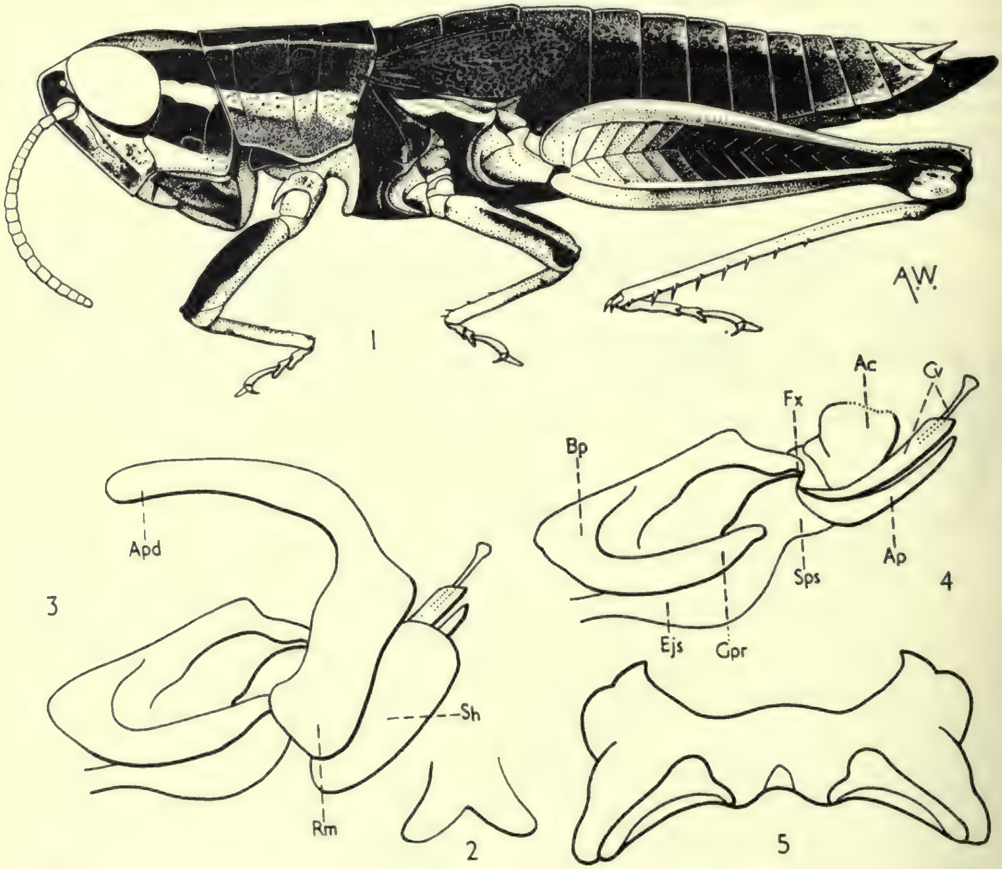

FIG. 3. *Paraspathosternum andringitra* sp. n. 1, male, type. 2, prosternal process. 3, phallic complex, with ectophallic membrane and epiphallus removed. 4, the same, with most part of cingulum removed. 5, epiphallus.

The new species externally is very similar to the African *Paraspathosternum pedestris* (Miller, 1929). The phallic complex however is rather different. Flexure-like connection between basal and apical valves of penis, which is present in *andringitra* is absent in *pedestris*. Shape of apical valves of penis is different, and valves of cingulum are highly complicated in *andringitra*, but small and simple in *pedestris*. It is possible that they belong to different genera.

PSEUDOSERPUSIA gen. n.

Of medium size. Integument rugose and shiny. Antenna filiform, longer than head and pronotum together. Head slightly inflated, above subglobular ; fastigium of vertex strongly sloping forwards, angular, with obtuse, almost truncate apex, longitudinally concave ; interocular distance as wide as second basal antennal segment ; frons oblique and slightly incurved ; frontal ridge low, flat, in lower half almost obliterated. Eyes large, strongly convex. Pronotum subcylindrical, strongly rugose ; dorsum crossed by four deep, wide, transverse sulci ; median carina obtuse, forming between first and second, and between third and fourth sulci tubercle-like convexities, second being higher than first ; metazona about half length of prozona, its posterior margin slightly excurved, almost straight. Prosternal process widely conical, with acute apex. Mesosternal interspace wider than its length. Elytra lobiform, lateral, with rounded apex, reaching middle of second abdominal tergite. Tympanum vestigial. Hind

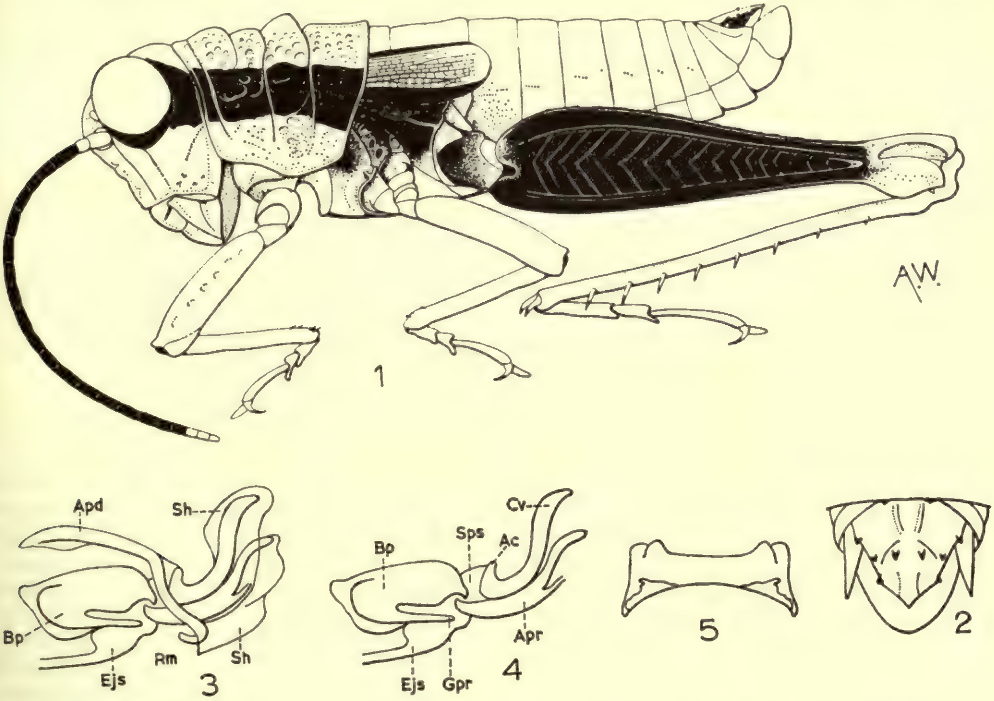

FIG. 4. *Pseudoserpusia polychroma* sp. n. 1, male, type. 2, end of male abdomen from above. 3, phallic complex, ectophallic membrane and epiphallus removed, lateral view. 4, the same, with most part of cingulum and sheath of penis removed. 5, epiphallus.

femur slender, with upper carina shallowly serrated ; external apical spine of hind tibia absent ; tarsus slightly elongated. Arolium large. Last abdominal tergite of male with pair of small acute projections ; supra-anal plate angular, with three pairs of lateral and one pair of medial teeth ; cercus acutely conical, straight ; subgenital plate short, obtusely conical. Valves of penis paired, divided, not forming flexure ; apical valves of penis and valves of cingulum large and strong ; sheath of penis large, wide, poorly sclerotized ; rami of cingulum narrow, strong, not connected on ventral side. Epiphallus with wide bridge ; small, wide ancorae and strong, lobiform lophi with subacute apices. Valves of ovipositor moderately slender, curved at apices. Subgenital plate trilobate.

Type species : *Pseudoserpusia polychroma* sp. n.

The new genus superficially resembles representatives of *Serpusia* group, but according to its genitalia, with disconnected valves of penis, belongs in the subfamily Hemiacridinae. It shows no close affinity with any known genus or group of genera. In the structure of pronotum it resembles the genus *Perineta* (see p. 342), but the similarity is only superficial, the genitalia being entirely different.

***Pseudoserpusia polychroma* sp. n.**

(Text-fig. 4)

♂. Type. Head strongly rugose ; weak occipital carinula present. Sides of mesosternal interspace roundly incurved ; metasternal interspace slightly longer than its width. Lower lobes of hind knee angular. General coloration ochraceous. Antenna black, with two basal segments ochraceous and two apical segments greenish. On sides of head and pronotum with wide, blackish longitudinal stripe, gradually fading towards base of hind femur. Elytron ochraceous, with brown anterior and posterior margins. Hind femur dark olive-green on both sides ; hind knee, tibia and tarsus bright red. Teeth on supra-anal plate black.

♀. Paratype. As the male, but larger.

Length of body ♂ 19, ♀ 25·5 ; pronotum ♂ 5·7, ♀ 7·5 ; elytron ♂ 3·2, ♀ 5 ; hind femur ♂ 13·6, ♀ 17 mm.

Madagascar Est : Maroantsetra, Ambohitsitondroina, 600 m., iii.1958, 1 ♂ type (P. Soga, E. Raharizonina), in Paris Museum.

Madagascar Centre : Tananarive, ii–iii.1950, 2 ♂, 1 ♀.

***PAULIANACRIS* gen. n.**

Large and slender. Integument finely rugose, extremely hairy. Antenna thin, filiform. Head strongly prognathous, subglobular above ; fastigium of vertex wide, roundly merging with frons, which is very short ; frontal ridge low, almost obliterated ; ocelli large, lateral ones located above bases of antennae ; eyes small, oval, flattened. Pronotum saddle-shaped ; dorsum crossed by three sulci, posterior one deep and strong ; carinae absent ; metazona slightly longer than prozona, its posterior margin obtusangular, with obtuse apex. Prosternum comparatively long, with projecting collar-like anterior margin and deep transverse furrow in middle ; its posterior half with longitudinal, irregular, ridge-like convexity and, in the middle of it, with deep longitudinal sulcus. Prosternum large. Meso-metasternum longitudinally concave ; mesosternal interspace slightly longer than its width. Elytra and wings fully developed, well exceeding end of abdomen ; anterior margin of elytron almost straight, apex obliquely truncate ; membrane thin, transparent, reticulation sparse ; stridulatory veinlets strongly reduced. Wing of normal shape. Tympanum present. All femora compressed ;

hind femur slender, not reaching end of abdomen. Hind tibia extremely hairy, external apical spine present. Tarsi of normal length. Ovipositor with strongly curved acute valves; upper external margin of upper valve irregularly toothed.

Male unknown.

Type species: *Paulianacris hirsuta* sp. n.

The new genus is of unusual appearance, with extremely prognathous head, elongated prosternum, peculiar form of elytron and exceptional hairiness of body. These characters isolate it from all known genera. However, it probably belongs to the same group as *Hemiacris*, *Phalinus* and *Clonacris* which are arboreal in habits.

The genus is named after Dr. R. Paulian whose exploration and study of Madagascar contributed very much to our knowledge of this geographical region.

***Paulianacris hirsuta* sp. n.**

(Text-fig. 5)

♀. Type. General coloration light grey, with small blackish and brownish dots scattered all over pronotum and elytra. Hairs long, whitish. Prosternum in middle, mesosternum above furcal suture and metasternum in region of metasternal interspace with black spots. Internal and lower sides of hind femur bluish black, internal side with whitish pre-apical and incomplete whitish medial fascia. Internal side of hind tibia dark purple.

Length of body 43; pronotum 5·7; elytron 40; hind femur 20·5 mm.

Madagascar SW., Sakaraha: Lambomakandro, 500 m., vii.1957, 1 ♀ type (Andria Robinson), in Paris Museum.

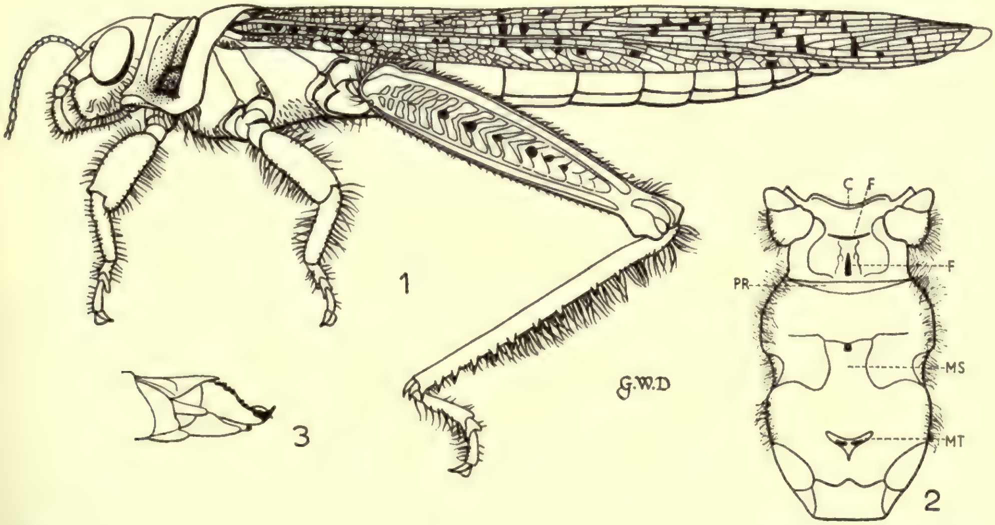

FIG. 5. *Paulianacris hirsuta* sp. n. 1, female, type. 2, sternum, C, collar; F, transverse and longitudinal furrows of prosternum; PR, presternum; MS, mesosternal interspace; MT, metasternal interspace. 3, end of abdomen, lateral view.

HYSIELLA I. Bolivar, 1906

Hysia Stål, 1875 : 30.
Hysiella I. Bolivar, 1906 : 395.

Of medium size. Body slender, narrowly cylindrical. Integument finely rugose. Antenna filiform, longer than head and pronotum together. Head conical, globular above ; fastigium of vertex angular, sloping forwards, separated from vertex by depression ; frons strongly oblique, straight ; frontal ridge low, sulcate on whole length, with obtuse carinulae ; interocular distance slightly wider than basal antennal segment. Pronotum cylindrical ; carinae absent ; four wide sulci crossing dorsum ; metazona one-third the length of prozona, its posterior margin slightly incurved. Prosternal process short, antero-posteriorly compressed, widening towards apex, which is slightly concave in middle. Mesosternal interspace longer than its width, with incurved sides. Elytra, wings and tympanum absent. Hind femur slender, reaching end of abdomen. External apical spine of hind tibia present. Tarsus elongated. Arolium large. Last abdominal tergite of male with pair of acute projections. Supra-anal plate angular, with strong transverse furrow and pair of lateral projections. Cercus straight, acutely conical. Subgenital plate short, conical. Female subgenital plate obtusangular. Ovipositor robust, with short valves, slightly curved at apices.

Type species : *Hysia nigricornis* Stål, 1875.

This genus, originally described as *Hysia* Stål, 1875 (*nom. preoc.*), belongs to the *Tarbaleus* group with which it shares the shape of head, pronotum and general appearance. However, its relationships cannot be finally established until the male genitalia have been examined.

Hysiella nigricornis (Stål, 1875)
(Text-fig. 6)

Hysia nigricornis Stål, 1875 : 30.
Hysiella nigricornis (Stål, 1875) ; I. Bolivar, 1906 : 395.

♂. General coloration brownish olive-green. Antenna black, with ochraceous apex. Along head, lateral lobe of pronotum, to base of hind femur a narrow black stripe, and below it a wide yellowish stripe. External side of hind femur yellowish along upper part, with black stripe, serrated at lower margin ; internal and lower side orange-red ; internal side of hind knee black ; hind tibia dark olive-green, lower side almost black ; tarsus olive-green.

♀. As the male, but larger.

Length of body ♂ 19, ♀ 27·5–36·5 ; pronotum ♂ 3·4, ♀ 5·4–6 ; hind femur ♂ 10, ♀ 15·2–17·6 mm.

Madagascar Est : Ambila-Lemaitso, 1 ♀ (R. Paulian) ; Mananara, Antanambe, 5 m., iv.1958, 1 ♀ (P. Soga, E. Raharizonina) ; forêt au Nord d'Anosibe, i.1951, 1 ♂ (R. Paulian).

ONETES Rehn, 1944

Of medium size. Integument finely rugose. Head slightly inflated. Antenna filiform, shorter than head and pronotum together. Fastigium of vertex short, with obtuse almost truncate apex, roundly merging with frons ; face short and wide ; frons almost vertical, slightly convex ; frontal ridge low. Eyes large, interocular distance wide. Pronotum subcylindrical, sometimes slightly constricted, with rounded posterior margin ; carinae absent ; three sulci crossing dorsum. Prosternal process low, almost square, with flattened apical surface ; meso-

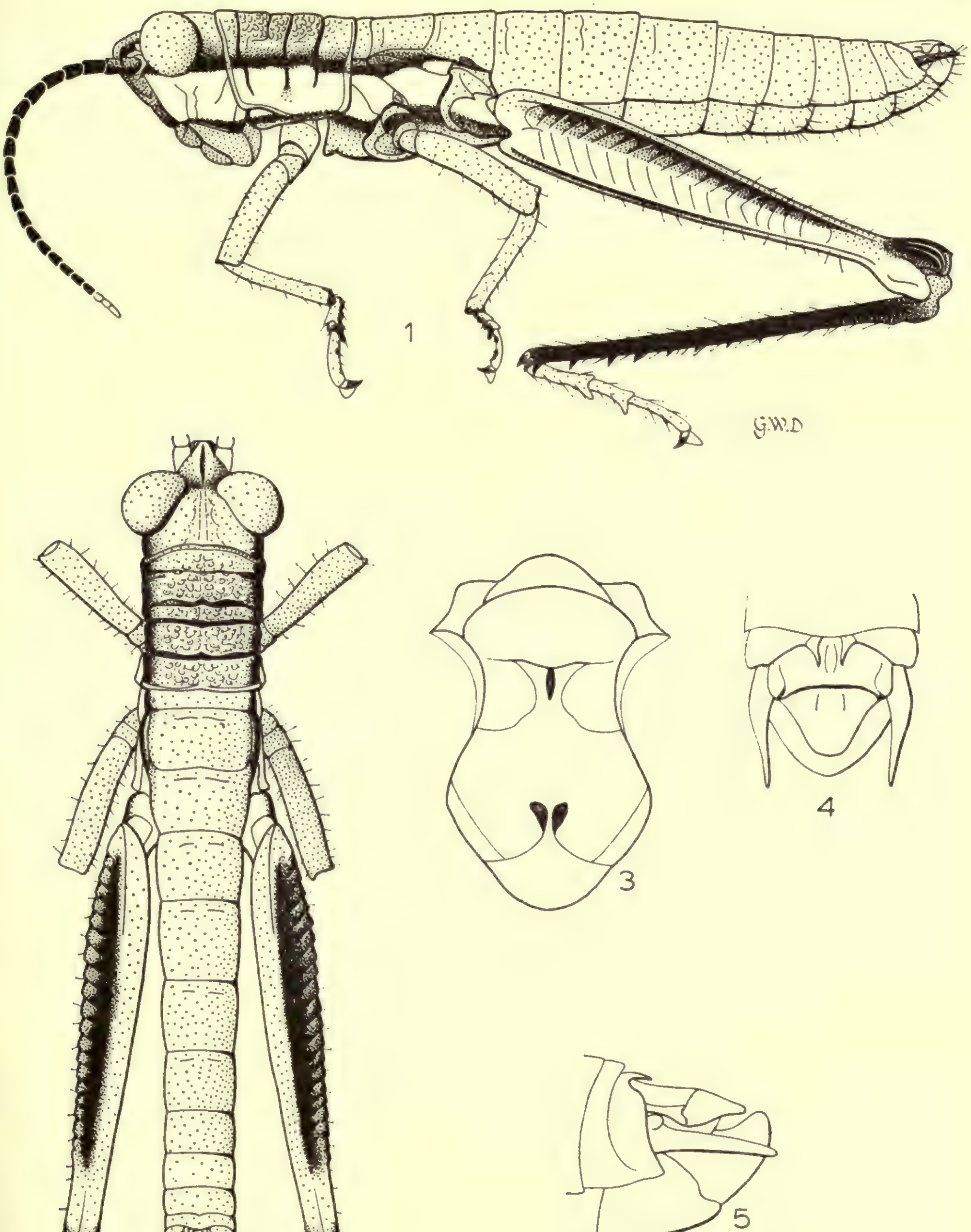

FIG. 6. *Hysiella nigricornis* (Stål, 1875). 1, male, type, lateral view. 2, the same, from above. 3, meso- and metasternum. 4, end of abdomen, from above. 5, the same, lateral view.

sternal interspace constricted in middle and widened in front. Elytra and wings fully developed or slightly shortened ; stridulatory veinlets in radial area of elytron reduced ; wing comparatively wide. Hind femur compressed. External apical spine of hind tibia present. Tarsi of normal length or slightly elongated. Ovipositor moderately short with valves curved at apices.

Type species : *Onetes sanguinolentus* Rehn, 1944.

The three known species of the genus have all been described from females. The male of a species which is tentatively put into the genus *Onetes* is described below, but since I am not sure about its generic status, the male characters are not included in the generic diagnosis but only in the specific description.

Onetes scudderi (Finot, 1903)

(Text-fig. 7)

Euthymia scudderi Finot, 1903 : 630.
Onetes scudderi (Finot, 1903) Rehn 1944 : 51.

♀. Of medium size. Integument finely rugose and slightly hairy. Antenna thin filiform, shorter than head and pronotum together. Head slightly prognathous, globular above ; fastigium of vertex wide, sloping forwards, roundly merging with frontal ridge ; frons short, convex ; frontal ridge wide, low, with flat, rugose surface, widening between antennae. Ocelli large. Pronotum cylindrical, without carinae, crossed by three sulci ; metazona shorter than prozona, its posterior margin rounded. Prosternal process low, pyramidal, with flattened and concave apical surface, in front view slightly bilobate. Meso-metasternum longitudinally concave ; mesosternal interspace elongate, narrow, constricted in middle. Elytra and wings fully developed, exceeding end of abdomen ; row of stridulatory veinlets of radial area of elytron short, containing seven to nine veinlets ; wing slightly widened, with external margin strongly excurved. Middle femur compressed. Hind femur strongly compressed ; hind tibia hairy, with external apical spine present ; hind tarsus elongated. Arolium large. Female subgenital plate with trilobate apex ; ovipositor short, robust, with obtuse, apically slightly curved valves. General coloration pale brownish ; elytra without pattern ; wings infumate ; hind femur on external side with few irregularly placed dark brown dots ; internal side red with two blackish fasciae and blackish internal side of knee ; hind tibia red.

Length of body 40 ; pronotum 7·6 ; elytron 32 ; hind femur 21 mm.

Only female type known, from Maroancetra, Antougi Bay.

Onetes sanguinolentus Rehn, 1944

This species is known to me from description only. It differs from *O. scudderi* mainly by slightly constricted pronotum and by spotted elytra.

Only female type known.

Length of body 36·5 ; pronotum 6·6 ; elytron 20·2 ; hind femur 16 mm.

Type locality " Madagascar ".

Onetes kraussi (Finot, 1903)

Euthymia kraussi Finot, 1903 : 632.
Onetes kraussi (Finot, 1903) Rehn, 1944 : 51.

This species is known to me from description only. It differs from *O. scudderi* by smaller size of body; by elytra hardly reaching end of abdomen and by the presence of the spots on elytra.

According to descriptions it is rather similar to *O. sanguinolentus* Rehn.

Only female type known. Length of body 29; pronotum 6·4; elytron 18; hind femur 15·5 mm.

Type locality " Madagascar ".

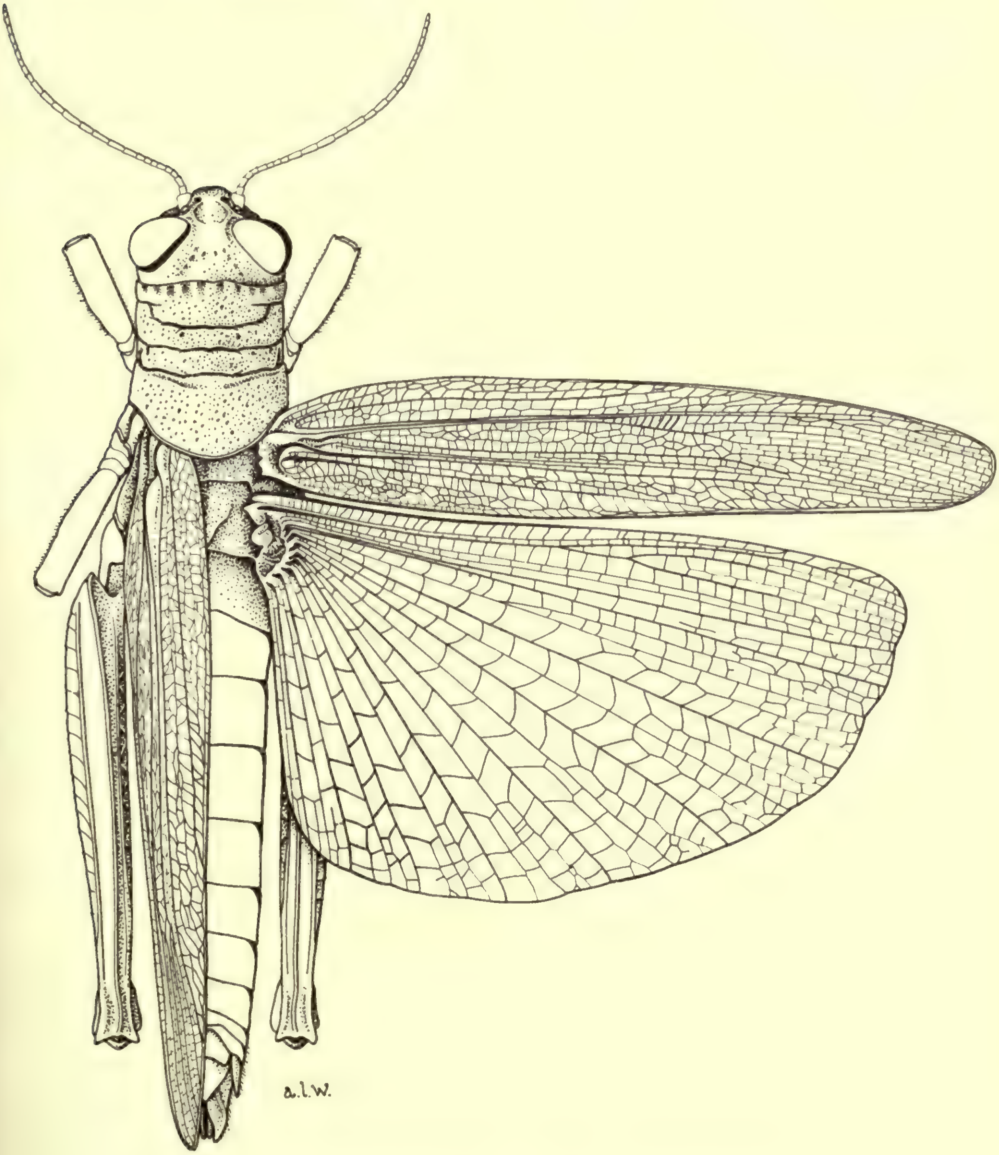

FIG. 7. *Onetes scudderi* (Finot, 1903). Female, type.

Onetes fasciatus sp. n.

(Text-fig. 8)

♂. Type. Of medium size. Integument rugose and hairy. Antenna filiform, much longer than head and pronotum together. Head slightly inflated, globular above; fastigium of vertex strongly sloping forwards, widening towards apex, shallowly depressed in middle and roundly merging with frontal ridge; carinula of vertex present; frons short, vertical; frontal ridge low, strongly widened between antennae and constricted below ocellus; concave in upper part; ocelli large. Pronotum cylindrical, dorsum crossed by three deep sulci; carinae absent; metazona shorter than prozona, its posterior margin obtusangular, almost rounded. Prosternal process very low with flat, trapezoidal apical surface. Meso-metasternum longitudinally concave; mesosternal interspace wide, constricted in middle. Elytra and wings shortened, not reaching eighth abdominal tergite; anterior margin of elytron regularly excurved, apex rounded; stridulatory veinlets of radial area strongly reduced; wing widened, with strongly excurved external margin. Middle femur compressed. Hind femur compressed, almost reaching end of abdomen; hind tibia hairy; external apical spine present; hind tarsus elongated; arolium large. Male supra-anal plate elongate angular, with slightly attenuate apex. Cercus narrow, conical, straight. Subgenital plate short, conical, with slightly attenuate apex. Epiphallus with short, angular ancorae and wide lobiform lophi with angular apices. Penis strongly protruding vertically from upper part of subgenital plate; basal and apical valves of penis not connected; apical valves of penis strongly elongated. Valves of cingulum strongly shortened; sheath of penis short; arch of cingulum robust.

General coloration pale brownish, with yellowish irregular spots. Membrane of elytron olive-green; venation pale ochraceous; wing infumate. Both sides of hind femur greenish black, with three pale ochraceous transverse fasciae; hind tibia brownish.

Length of body 27·5; pronotum 4·2; elytron 15·7; hind femur 14·5 mm.

Ampijoroa, 170 m. Foret l'Ankarafantsika, i.1957, 1 ♂ type, (R.E.), in Paris Museum.

Group **EUTHYMIAE**

The group name Euthymiae was used first by Brunner v. Wattenwyl in 1893, to include *Euthymia* Stål, 1875; *Hysia* Stål, 1875; *Lentula* Stål, 1878 and, with question mark, *Gergis* Stål, 1875. In 1929 discussing the group Ramme placed in it 12 genera and suggested the possibility of including five more. Uvarov (1943) placed eight genera in the group. All these authors were concerned only with Old World genera. In 1938 Rehn revised Neotropical Euthymiae, and in 1944 the Old World Euthymiae, and included in this group a large number of genera which by their peculiar appearance differed from the other genera of the Catantopinae, in which they were formerly included. As a result the group became a highly artificial, heterogeneous assemblage.

Recently, according to the structure of the phallic complex and other characters, a number of genera were removed to the family Lentulidae and to the subfamily Hemiacridinae of Acrididae (Dirsh, 1956). The remaining genera are still formally in the group Euthymiae, confusing the interrelations of *Euthymia* and allied genera with other Acrididae.

According to the structure of the penis, the basal and apical valves of which are near but disconnected, *Euthymia* and allied genera belong in the subfamily Hemiacridinae. The second external character of the subfamily, namely the presence of

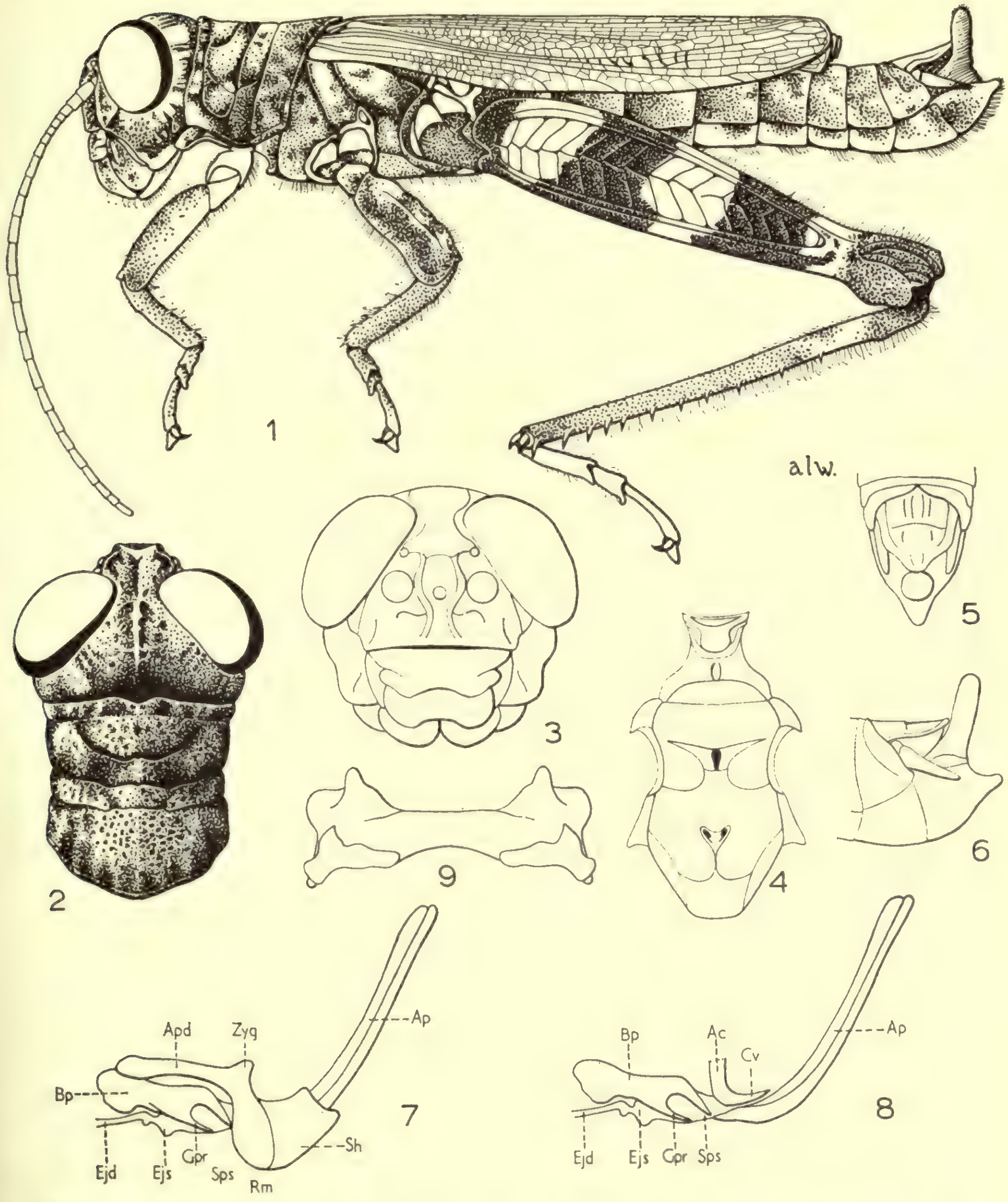
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FIG. 8. *Onetes fasciatus* sp. n. 1, male, type. 2, head and pronotum from above. 3, face. 4, sternum. 5, end of abdomen, from above. 6, the same, lateral view. 7, phallic complex, with most part of ectophallic membrane and epiphallus removed. 8, the same, with part of cingulum removed. 9, epiphallus.

the stridulatory veinlets in the radial area of the elytron, however, is not so clear. In some species of the genus *Euthymia* (e.g. *E. fasciata*) these veinlets are reduced to such an extent that they are indistinguishable from ordinary veinlets of the reticulation. In *E. bolivari*, however, the stridulatory veinlets in males are distinct.

It is proposed here that the group Euthymiae be restricted to the following genera : *Euthymia* Stål, 1875 ; *Lopheuthymia* Uvarov, 1943 and *Proeuthymia* Rehn, 1944, all of them from Madagascar. Other genera formerly referred to the group need further study before their position can be determined.

The group Euthymiae can be characterized by the structure of the phallic complex, with basal and apical valves very near but disconnected, large sheath covering whole apical valves of penis except the tips ; well developed apodemes of cingulum, and strong, bridge-shaped epiphallus, with short, wide ancorae and large lobiform lophi. Amongst the external characters may be mentioned inflated head, compressed hind femur and elongated hind tarsus.

EUTHYMIA Stål, 1875

Of medium size. Antenna filiform, longer than head and pronotum together. Head subglobular, slightly inflated. Fastigium of vertex short, wide, with trapezoidal apex, flat, sloping forwards and roundly merging with frons, which is straight and slightly oblique or vertical ; frontal ridge wide, low, flat. Pronotum cylindrical, without carinae ; three narrow sulci crossing dorsum ; metazona shorter than prozona, its posterior margin obtusangular. Prosternal process low, obtusely conical ; mesosternal interspace longer than its width, constricted in middle. Elytra and wings fully developed or slightly shortened, not reaching end of abdomen ; in males with excurved anterior margin, in females with widened and protruding costal area in basal half, stridulatory veinlets of radial area of elytron reduced, sometimes almost indistinguishable from ordinary ones. Wings wide, with strongly excurved posterior margin. Hind femur compressed. External apical spine of hind tibia present. Hind tarsus elongated. Arolium large. Male supra-anal plate elongate-angular. Cercus narrow, conical, straight or curved. Male subgenital plate short, subconical or acutely conical. Basal and apical valves of penis very close, but disconnected ; sheath of penis large ; arch of cingulum present ; apodeme strong ; epiphallus with narrow bridge, short wide ancorae and wide, lobiform lophi. Ovipositor with moderately short valves, curved at apices.

Type species : *Euthymia melanocerca* Stål, 1875.

Key to Species

1 (4) Female elytron with regularly excurved basal half. Male subgenital plate obtusely conical ; supra-anal plate with regularly angular apex. Lower margin of the lower lobe of hind knee roundly excurved.

2 (3) Fastigium of vertex protruding in front of eyes ; head relatively narrower and less inflated. Basal half of anterior margin of female elytron more excurved. Male supra-anal plate relatively wider (Text-figs. 9, 1–9) . . . **fasciata**

3 (2) Fastigium of vertex scarcely protruding in front of eyes ; head relatively wider and more inflated. Basal half of anterior margin of female elytron less excurved. Male supra-anal plate relatively narrower (Text-figs. 9, 10–12) **polychroma**

4 (1) Basal half of female elytron step-like, separated from apical half. Male subgenital plate acutely conical ; supra-anal plate with attenuate apex. Lower margin of the lower lobe of hind knee with tooth-like projection (Text-figs. 9, 13–15) **bolivari**

Euthymia fasciata (Walker, 1870)

(Text-fig. 9)

Oxya fasciata Walker, 1870 : 646.
Euthymia fasciata (Walker, 1870) Kirby, 1910 : 384.
Euthymia melanocerca Stål, 1875 : 29 ; Uvarov, 1943 : 387.

♂. Of medium size, robust. Integument dotted, hairy. Fastigium of vertex protruding in front of eyes ; head moderately inflated. Elytra reaching base of supra-anal plate, with regularly excurved anterior margin. Lower margin of lower external lobe of hind knee roundly excurved ; hind tarsus about half as long as tibia. Supra-anal plate elongate-angular, with obtuse apex and longitudinal convexity in middle. Cercus straight, narrow, acutely conical. General coloration olive-green ; antenna blackish ; lateral lobe of pronotum with indefinite pinkish spot ; base of elytron with black spot ; hind wing blackish-infumate ; hind femur on all sides orange-red, but external side slightly olive-greenish ; hind knee black ; hind tibia blackish olive-green ; abdomen with alternating black and ochraceous transverse stripes.

♀. As the male, but larger and more robust. Basal half of external margin of elytron strongly, regularly excurved.

Length of body ♂ 22–24, ♀ 33–38 ; pronotum ♂ 4·8–5, ♀ 7·5–8 ; elytron ♂ 14–15, ♀ 17–21 ; hind femur ♂ 11·6–12, ♀ 16–17·5 mm.

Madagascar Est : Manambato sur l'Anove, 1 ♀ ; Ile Sainte Marie, Ambohidema, v.1959, 6 ♀, 1 ♂ ; Ambatoroa, v.1909, 1 ♀ (E. Razafimandimby) ; Tamatave Ranomafana, 3 ♀ ; Ambila-Lemaitso, 3 ♀, 1 ♂ ; Rogez, vi.1957, 1 ♀ ; Midongy du Sud, mont Papango, 1,200 m., iii.1959, 1 ♀ (A. Robinson).

Madagascar Ouest : forêt de l'Ankarafantsika, 120 m. xii. 1959, 2 ♀ (E. Raharizonina).

Euthymia polychroma Brancsik, 1893

(Text-fig. 9)

Euthymia polychroma Brancsik, 1893 : 190.
Euthymia viridescens Sjöstedt, 1918 : 12, **syn. n.**

♂. Differs from *E. fasciata* (Walk.) by the following characters :

Size of body smaller. Fastigium of vertex scarcely protruding in front of eyes ; head relatively wider and more inflated. Anterior margin of elytron slightly, regularly excurved. Supra-anal plate narrower, with less obtuse apex. General coloration dark olive-green or dark ochraceous ; posterior margin of pronotum, near the basal black spot of elytron, with black edge ; internal side of hind femur orange, external side purplish (in ochraceous coloured specimens external side ochraceous).

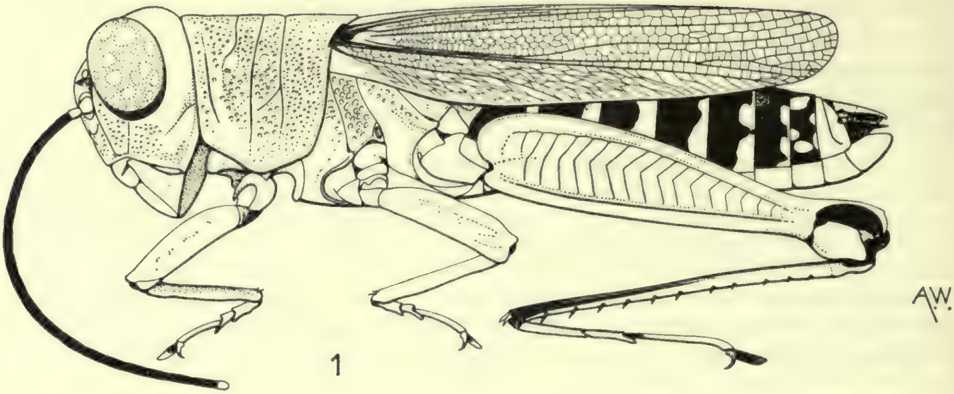
♀. As the male, but larger. Anterior margin of elytron, in basal half, regularly excurved.

Length of body ♂ 21–22, ♀ 31–33 ; pronotum ♂ 5·3, ♀ 7–8 ; elytron ♂ 13–13·5, ♀ 17–20 ; hind femur ♂ 12, ♀ 15·5–18 mm.

Madagascar Sambirano : Nosy Be, réserve de Lokobe, 4.ix.1947, 1 ♂, 2 ♀ (R. Paulian).

Madagascar Est : Tamatave, Amboditafana, vi.1958, 2 ♂ (E. Razafimandimby).

Euthymia polychroma Brancsik was synonymized by Uvarov, 1943 with *E. fasciata* (Walker). However, a comparison of a series of specimens with the description and figure by Brancsik showed that *E. polychroma* should be regarded as a valid species, which differs from *E. fasciata* by the characters indicated in the key. Since the



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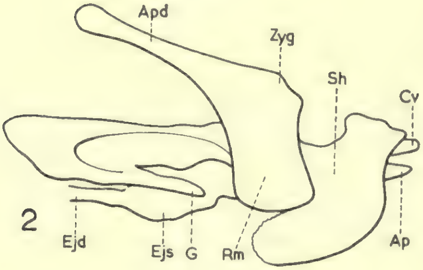
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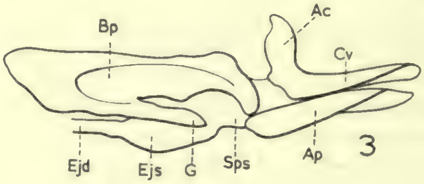
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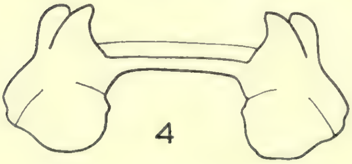

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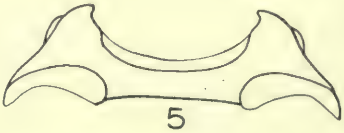

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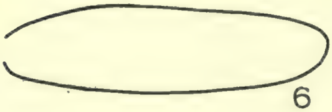

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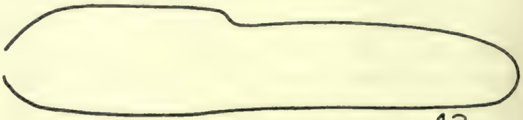

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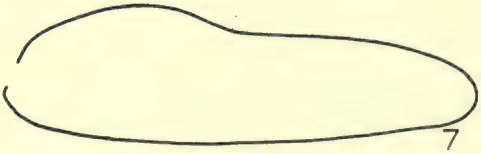

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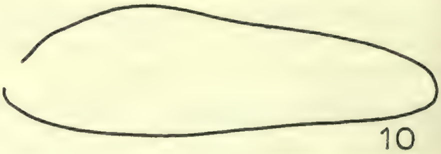

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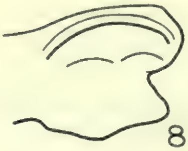

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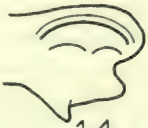

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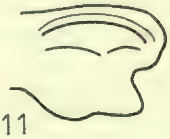

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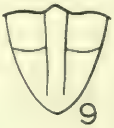

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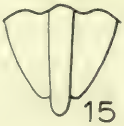

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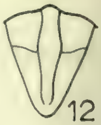

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type of *E. polychroma* is lost, I designate as neotype the female from Lokobe, Madagascar, which corresponds best with Brancsik's description and figure. The neotype is in the Paris Museum.

The species varies in general coloration from dark olive-green to ochraceous.

The type of *E. viridescens* Sjöstedt was examined and proved to be conspecific with *E. polychroma* Brancsik.

Euthymia bolivari Finot, 1903

(Text-fig. 9)

♂. Of medium size. Integument finely dotted and moderately hairy. Head moderately inflated; fastigium of vertex well protruding in front of eyes. Posterior margin of pronotum obtusangular, almost rounded. Elytron reaching or exceeding end of abdomen, its anterior margin slightly and regularly excurved; stridulatory veinlets mostly distinct. Lower external margin of lower lobe of hind knee with tooth-like projection. Supra-anal plate elongate-angular, with attenuated apex and longitudinal convexity in middle. Cercus narrow, incurved and downcurved, with acute apex. Subgenital plate acutely conical. General coloration from light olive-green to ochraceous; antenna black; base of elytron with small black spot; hind wing blackish infumate; hind femur light orange; hind knee black; hind tibia blackish, sometimes with orange sub-basal ring; abdomen with alternating black and ochraceous-orange transverse stripes.

♀. As the male, but larger. Basal half of anterior margin of elytron strongly projecting and step-like, separated from apical half. Ovipositor slender, with slightly curved valves.

Length of body ♂ 21–24, ♀ 27–35; pronotum ♂ 4–4·6, ♀ 5·8–6; elytron ♂ 17·3–20, ♀ 23–24·5; hind femur ♂ 11–12·7, ♀ 14–16 mm.

Madagascar Ouest: forêt de l'Ankarafantsika, Ampijoroa, 2 ♂.
Madagascar Est: réserve de Zakamena, 1 ♂, 1 ♀; Perinet, 1 ♀, 1 ♂.

PROEUTHYMIA Rehn, 1944, **stat. n.**

Euthymia (*Proeuthymia*) Rehn, 1944: 31.

Proeuthymia, which was described by Rehn as a subgenus of *Euthymia*, is here considered as a genus. It differs from *Euthymia* by the following characters:

Male supra-anal plate wide, its sides obtusangularly incurved, apex obtusangular with lateral angles slightly attenuate; a middle transverse suture divides it into a basal part with median longitudinal concavity, and an apical half, with a pair of lateral tubercles. Lophi of epiphallus narrow, acutely angular. Gonopore process of phallus large, wide and very robust.

Type species: *Euthymia saussurei* Finot, 1903.

FIG. 9. 1–9, *Euthymia fasciata* (Walker, 1870). 1, male. 2, phallic complex, with ectophallic membrane and epiphallus removed. 3, the same, with most part of cingulum and sheath of penis removed. 4, epiphallus, lophi in horizontal position. 5, the same, lophi in vertical position. 6, right male elytron. 7, the same, female elytron. 8, hind knee, external side. 9, male supra-anal plate. 10–12, *Euthymia polychroma* Brancsik, 1893. 10, female right elytron. 11, hind knee, external side. 12, male supra-anal plate. 13–15, *Euthymia bolivari* Finot, 1903. 13, right female elytron. 14, hind knee, external side. 15, male supra-anal plate.

Proeuthymia saussurei (Finot, 1903), **stat. n.**

(Text-fig. 10)

Euthymia saussurei Finot, 1903 : 625.
Euthymia (*Proeuthymia*) *saussurei* (Finot, 1903) ; Rehn, 1944 : 32.

♂. Of medium size. Integument almost smooth. Antenna filiform, longer than head and pronotum together. Head slightly inflated ; fastigium of vertex trapezoidal, well protruding in front of eyes, with truncate apex ; frons oblique ; frontal ridge low, wide, above ocellus flat, below it constricted and concave. Pronotum subcylindrical, without carinae ; three deep, wide sulci crossing dorsum ; metazona slightly shorter than prozona, its posterior margin obtusangular. Prosternal process low, subconical, with obtuse apex. Mesosternal interspace longer than its width, narrowing in front. Elytra slightly exceeding end of abdomen, anterior margin in basal half slightly excurved ; stridulatory veinlets strongly reduced, indistinguishable from ordinary veinlets. Hind wing relatively narrow. Hind femur moderately compressed ; lower margin of lower external lobe of hind knee with tooth-like projection. Hind tarsus less than half the length of tibia. Arolium large. Supra-anal plate almost as wide as its length. Cercus compressed, narrow, angular, with acute apex. Subgenital plate short, obtusely subconical. General coloration olive-green ; antenna black ; transverse sulci of pronotum black ; hind wing pink, with infumate external margin ; hind femur light green on all sides ; hind knee black ; tibia with black base, light green in middle and blackish at apex ; spines black ; hind tarsus red.

♀. As the male, but larger. Anterior margin of elytron, in basal half, regularly excurved. Ovipositor short, with slender valves, slightly curved at apices.

Length of body ♂ 19–22, ♀ 23–27 ; pronotum ♂ 4–4·7, ♀ 6–6·5 ; elytron ♂ 12·5–16·6, ♀ 19–21 ; hind femur ♂ 11·4–12, ♀ 13·5–16 mm.

Madagascar Sud Ouest : Sakaraha, Lambomakandro, xii.1956, 1 ♂, 3 ♀.
Madagascar Ouest : forêt de l'Ankarafantsika, 20.i.1950, 1 ♂.

LOPHEUTHYMIA Uvarov, 1943

Of medium or large size. Integument rugose and hairy. Antenna filiform, longer than head and pronotum together. Head slightly prognathous ; fastigium of vertex strongly sloping forwards, roundly merging with frons and not protruding in front of eyes ; frons depressed,

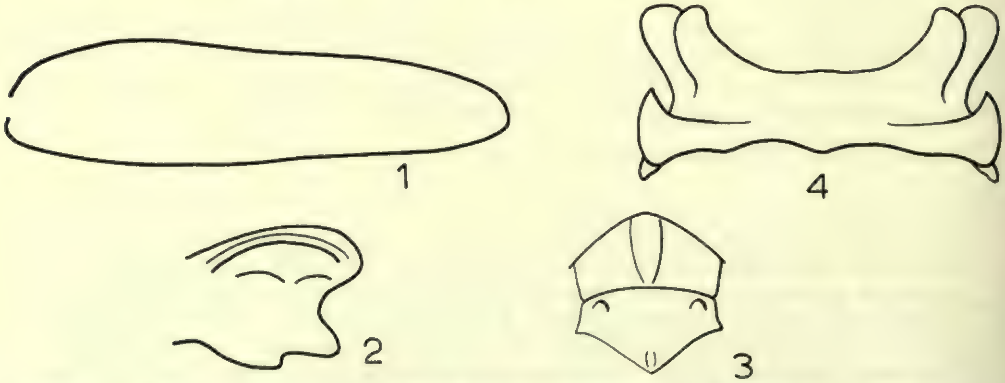

FIG. 10. *Proeuthymia saussurei* (Finot, 1903). 1, female right elytron. 2, hind knee, external side. 3, male supra-anal plate. 4, epiphallus.

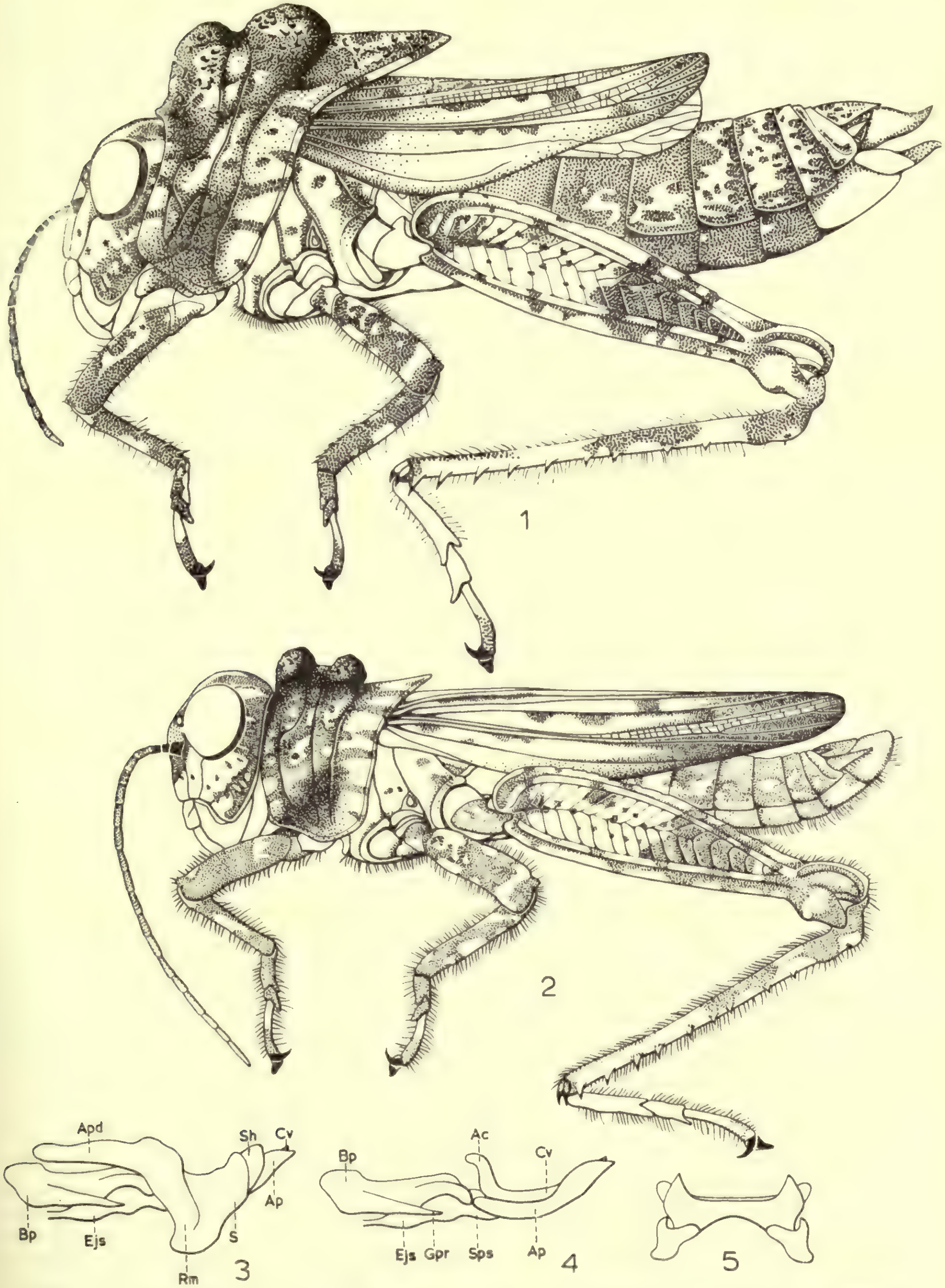
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FIG. 11. *Lopheuthymia brunneri* (Finot, 1903). 1, female. 2, male. 3, phallic complex, with most part of ectophallic membrane and epiphallus removed. 4, the same, with most of cingulum removed. 5, epiphallus.

frontal ridge low, flat, widening from base of antennae upwards. Pronotum tectiform, in prozona with two high tooth- or tubercle-like projections ; three deep sulci crossing dorsum ; metazona shorter than prozona, its posterior margin acutangular. Prosternal process low, almost square, with slightly concave apical surface. Mesosternal interspace slightly wider than its length and slightly constricted in middle. Elytra and wings not reaching end of abdomen ; stridulatory veinlets of radial area of elytron reduced. Hind wing widened, with expanded posterior margin. Hind femur compressed ; hind tarsus elongated. Arolium large. Last abdominal tergite of male with pair of angular projections ; supra-anal plate angular, with trilobate apex, lateral lobes small, and with two lateral tubercles behind median transverse suture ; cercus narrow, incurved, with acute apex ; subgenital plate short, subconical. Basal and apical valves of penis very close, but clearly divided ; sheath of penis large. Epiphallus bridge-shaped, with short, wide ancorae and large lobiform lophi. Female subgenital plate deeply trilobate. Ovipositor moderately short, with curved valves.

Type species : *Euthymia brunneri* Finot, 1903.

Lopheuthymia brunneri (Finot, 1903)

(Text-fig. 11)

Euthymia brunneri Finot, 1903 : 633.
Lopheuthymia brunneri (Finot, 1903) Uvarov, 1943 : 388.

♂. Of medium size. Head slightly prognathous. General coloration brown ; elytra and pronotum dirty ochraceous, with small dark brown spots and stripes ; elytra sometimes with few small reddish spots ; hind wing blackish-infumate ; external side of hind femur ochraceous, apical half with blackish, irregular transverse fascia ; internal side black, with pre-apical ochraceous fascia ; hind knee black ; hind tibia reddish, with basal part and part of lower side blackened ; hind tarsus red, except blackish tip.

♀. As the male, but larger, with more prognathous head and relatively shorter elytra.

Length of body ♂ 22–25, ♀ 30–35 ; pronotum ♂ 5·5–6, ♀ 11–12 ; elytron ♂ 14–17·5, ♀ 16–18 ; hind femur ♂ 12–15·5, ♀ 17–18 mm.

Madagascar Est : Maroantsetra, Fampanambo, 1 ♀, 1 ♂ (J. Vadon) ; Ambodítavolo, 1 ♀ (Capuron) ; Perinet, 1 ♂.

GALIDEUS Finot, 1908

Of medium size ; body very strongly elongate and narrow. Integument finely rugose and sparsely hairy. Antenna filiform, in male longer, in female shorter than head and pronotum together. Head strongly elongate, acutely conical ; fastigium of vertex narrow, acutely angular, much longer than longest diameter of eye ; above convex ; at base, in front of eyes, with transverse depression and strong transverse furrow ; in profile, with acutely pointed apex ; frons slightly incurved ; frontal ridge narrow, low, with low, obtuse parallel lateral carinulae and shallow depression between them ; at apex lamelliformly compressed. Interocular distance about as wide as basal antennal segment. Ocelli vestigial. Pronotum cylindrical, with four shallow sulci, first and second sometimes indistinct ; metazona about one-fourth of length of prozona. Prosternal process widening towards apex, which is flattened, widened and slightly concave. Mesosternal interspace small, inverse triangular, closed. Elytra and wings shortened, slightly exceeding middle of abdomen ; elytron with rounded apex and strongly reduced stridulatory veinlets ; wing wide, with strongly excurved external margin. Hind femur narrow, slender, not reaching end of abdomen ; lower external lobe of hind knee angular ; external apical spine of hind tibia present ; tarsus slender, elongated, about half as long as tibia. Arolium large. Male supra-anal plate elongate angular, with attenuate apex ; cercus long, straight,

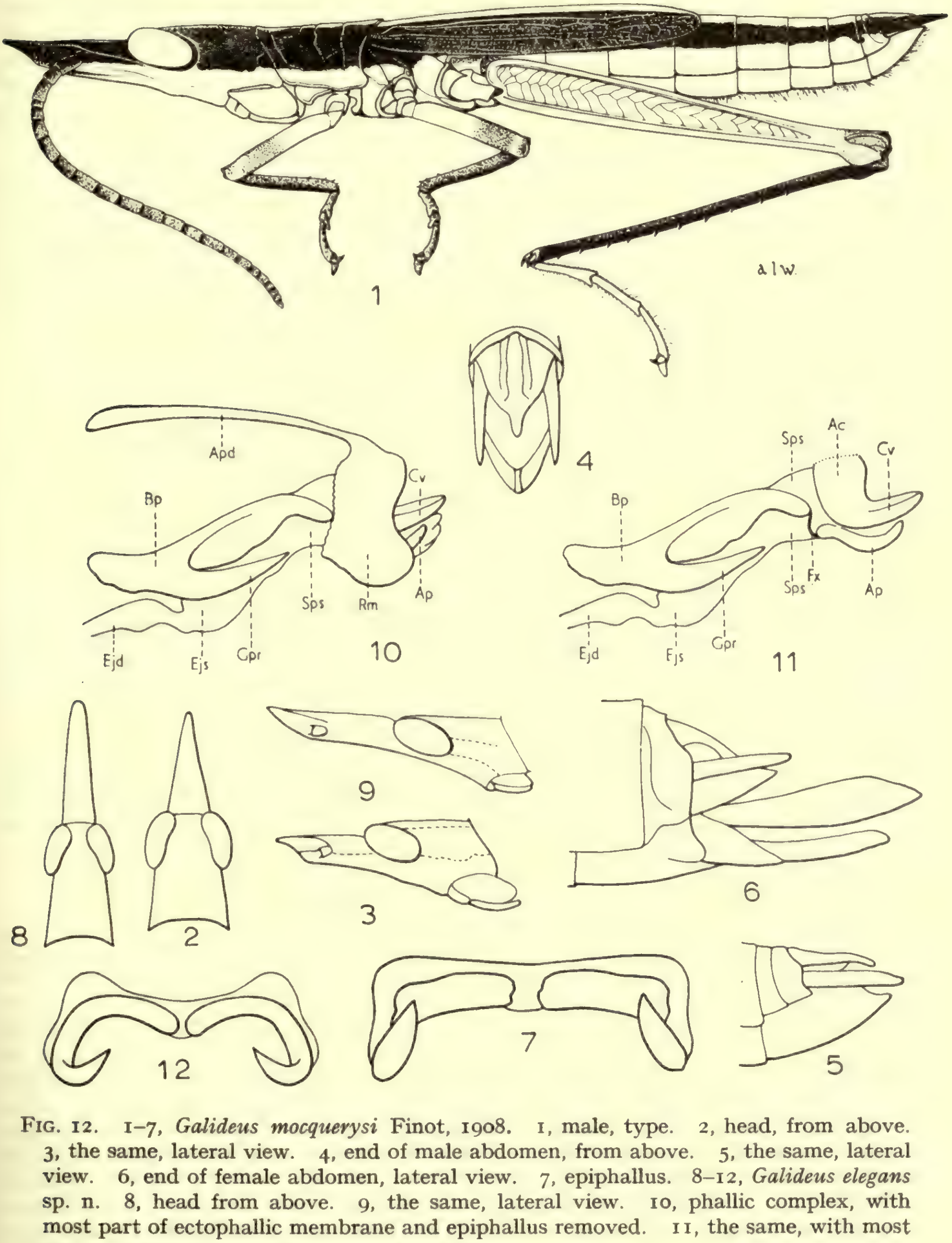
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FIG. 12. 1–7, *Galideus mocquerysi* Finot, 1908. 1, male, type. 2, head, from above. 3, the same, lateral view. 4, end of male abdomen, from above. 5, the same, lateral view. 6, end of female abdomen, lateral view. 7, epiphallus. 8–12, *Galideus elegans* sp. n. 8, head from above. 9, the same, lateral view. 10, phallic complex, with most part of ectophallic membrane and epiphallus removed. 11, the same, with most part of cingulum removed. 12, epiphallus.

almost cylindrical, with subacute apex ; subgenital plate short, acutely conical. Phallic organ rather slender. Basal and apical valves of penis connected by thin but strong flexure. Valves of cingulum large ; arch of cingulum wide and strong. Epiphallus bridge-shaped, without ancorae and with large, hook-shaped lophi. Ovipositor long, narrow, with straight valves.

Type species : *Galideus mocquerysi* Finot, 1908.

Galideus mocquerysi Finot, 1908

(Text-fig. 12)

♂. Antenna filiform on whole length. Fastigium of vertex slightly shorter than twice longest diameter of eye, with strongly acute, almost pointed apex. General coloration yellowish ; antenna black ; on sides, beginning at apex of fastigium of vertex, along whole head, pronotum and elytra there is wide, blackish stripe. Hind femur yellowish ; hind knee reddish ; hind tibia blackish purple ; tarsus reddish.

♀. As the male, but larger.

Length of body ♂ 31·5–34 ; ♀ 49 mm.

The ♂ type and ♀ paratype were studied.

Madagascar Est : Sambava, réserve naturelle XII, Marojejy, Andrakato, ii.1959, 1♂ (P. Soga).

Galideus elegans **sp. n.**

(Text-fig. 12)

♂. Type. Differs from *G. mocquerysi* Finot by slightly smaller size ; compressed basal part of antenna by fastigium of vertex being more than twice as long as longest diameter of eye, with apex parabolic. General coloration yellowish orange. Antenna light brownish ; lateral, longitudinal stripes of body brownish ; hind knee yellowish orange ; hind tibia bluish-black ; tarsus yellowish orange.

Female unknown.

Length of body 31 ; pronotum 4 ; elytron 11·3 ; hind femur 14 mm.

Madagascar Est : Ambodirafia, 7.ii.1934, 1 ♂ (type), (A. Seyrig) in Paris Museum.

Madagascar Centre : Ambohimitombo Forest, 26.i.1895, ♂ paratype in British Museum (Natural History).

XENIPPOIDES Chopard, 1952

Small ; body elongate cylindrical, stick-like. Antenna as long as head and pronotum together, ensiform, basal half triangular in cross-section. Head elongated, acutely conical ; fastigium of vertex narrow angular, strongly protruding in front of eyes, slightly convex, separated from vertex by fine furrow, with subacute apex ; frons strongly oblique and incurved ; frontal ridge narrow, strongly compressed above base of antennae, with narrow sulcus and obtuse lateral carinulae. Eyes elongate oval. Ocelli absent. Pronotum short, cylindrical ; dorsum crossed by three fine sulci ; metazona one-quarter the length of prozona, its posterior margin shallowly incurved. Prosternal process slightly spathulate, antero-posteriorly compressed, with slightly bilobate and slightly inflated apex. Mesosternal interspace inverse triangular, closed. In male, vestigial elytra present, wings and tympanum absent. Anterior and middle legs short. Hind femur slender, not reaching end of abdomen. External apical spine of hind tibia present. Hind tarsus slightly elongated. Arolium moderately large. Last abdominal tergite of male with small, widely rounded projections. Supra-anal plate elongate-angular. Cercus long, narrow, conical. Subgenital plate short, conical. Phallic complex slender. Sheath of penis absent ; rami large ; basal and apical valves of penis connected by flexure; apical valves of penis large, lobiform; valves of cingulum small; arch of cingulum present; gonopore processes long. Epiphallus bridge-shaped, with divided bridge, small obtuse ancorae and large hook-like, incurved lophi. Ovipositor long, slender, with valves straight, serrated on external margins and obtuse at apices. Supra-anal plate elongate angular. Cerci straight, narrow, stick-like, with obtuse apices. Subgenital plate with obtusely angular apex.

This peculiar genus, according to the shape of head, ovipositor and cercus, is probably related to *Galideus*, from which, however, it differs very strongly by the wings being vestigial in the male and absent in the female, by less elongated and less acute head, and by shorter tarsi and other characters.

Type species: *Xenippoides elongatus* Chopard, 1952.

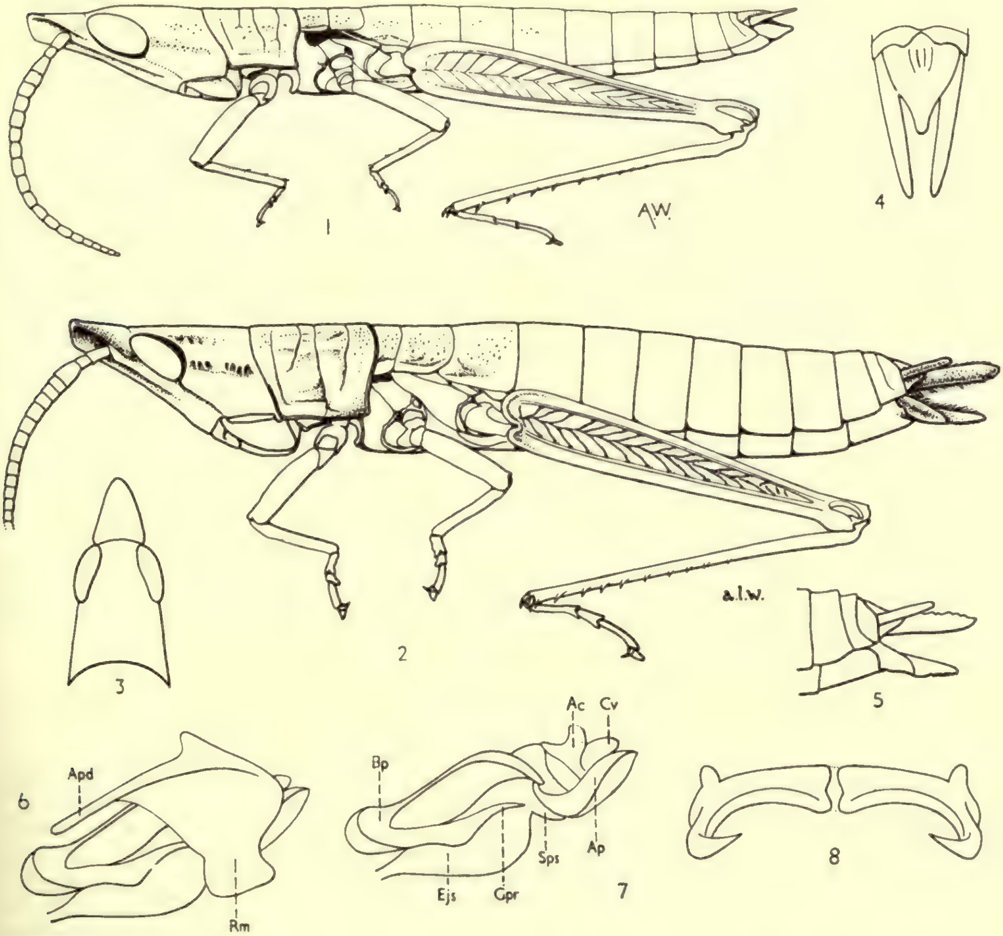

FIG. 13. *Xenippoides elongatus* Chopard, 1952. 1, male, type. 2, female, paratype. 3, head from above. 4, end of male abdomen, from above. 5, end of female abdomen, lateral view. 6, phallic complex, with ectophallic membrane and epiphallus removed. 7, the same, with most part of cingulum removed. 8, epiphallus.

Xenippoides elongatus Chopard, 1952

(Text-fig. 13)

♂. Integument finely rugose and sparsely hairy. Head smooth ; fastigium of vertex slightly upcurved and slightly dotted above. Lower margin of lateral lobes of pronotum straight. Lower lobe of hind knee angular, with obtuse apex. General coloration ochraceous, with indefinite darker stripes along sides of head and part of pronotum. At posterior margin of pronotum, on pleura, a small, elongate black spot. Hind tibia reddish.

♀. As the male, but larger.

Length of body, ♂ 19·5, ♀ 23·5 ; pronotum ♂ 2·5, ♀ 3 ; hind femur ♂ 9·2, ♀ 9·8 mm.

Madagascar Sambirano : Mont. Tsaratanana, forêt de mousses, 1 ♂ type, 1 ♀ paratype in Paris Museum.

Group **GERGISINI**

This group contains the following genera : *Gergis* Stål, 1875 ; *Malagasacris* Rehn, 1944 ; *Pachyceracris* gen. n. and *Morondavia* gen. n. The most remarkable feature of the group is the cubital vein of the hind wing connected with the medial (see Text-fig. 18). This may occur in the middle or in the more distal part of the cubitus, and is normally present only in this group of genera. Occasionally it has been observed also in the genera *Pareuthymia* Willemse, 1930, *Phalinus* Rehn, 1944 and *Enoplotettix* I. Bolivar, 1913.

The phallic complex was studied in one species of *Gergis*, and in *Malagasacris* and *Morondavia*. In the first two genera it agrees reasonably well with that of the subfamily Hemiacridinae (see Text-figs. 14–16). In *Morondavia* it possesses a rather thick flexure between basal and apical valves of penis which does not as a rule occur in Hemiacridinae, but the penis sheath is of Hemiacridinae type.

The characteristic stridulatory veinlets of Hemiacridinae, between radial and medial veins of elytron, are clearly distinct only in *Malagasacris*, while in other genera of the group they are greatly reduced or obliterated.

Since some of the essential characters of the group are rather obscure, I am tentatively placing it in the subfamily Hemiacridinae in the hope that further study of more material will clarify the question.

MALAGASACRIS Rehn, 1944

Small. Integument rugose. Antenna filiform, longer than head and pronotum together. Head inflated, globular above ; fastigium of vertex wide, strongly sloping forwards, with truncate apex ; frons short, slightly oblique, strongly rugose, with deep foveolae above antennae; frontal ridge wide, low, with flat, rugose surface, widest between and narrowed above and below antennae. Eyes and ocelli large, strongly convex ; interocular distance about twice as wide as basal antennal segments. Pronotum cylindrical ; dorsum crossed by three or four deep sulci ; metazona shorter than prozona, its posterior margin obtusangular, almost rounded. Episternum large, with attenuate anterior angle. Prosternal process low, with rounded apex. Mesosternal interspace wide, with incurved sides. Elytra and wings slightly shortened, reaching or almost reaching end of abdomen ; stridulatory veinlets of radial area of elytron reduced ; hind wing with roundly excurved external margin, cubital vein in apical quarter connected with medial vein. Hind femur slender; external apical spine of hind tibia present; hind tarsus elongated, exceeding half length of tibia. Arolium large. Male supra-anal plate angular. Cercus straight, narrow, conical. Subgenital plate short, subconical. Ectophallus membraneous; rami narrow; sheath of penis covering whole apical valves of penis; valves of cingulum well developed. Endophallus strongly sclerotized; basal valves of penis narrow, with very large gonopore processes; apical valves of penis long, narrow. Epiphallus bridge-shaped, with strong ancorae and short, wide, lobiform lophi.

Type species: *Malagasacris strateia* Rehn, 1944.

In *Malagasacris* the connection of the cubitus with the media in the hind wing occurs in the distal part of the veins and is less clear than in other genera of the group.

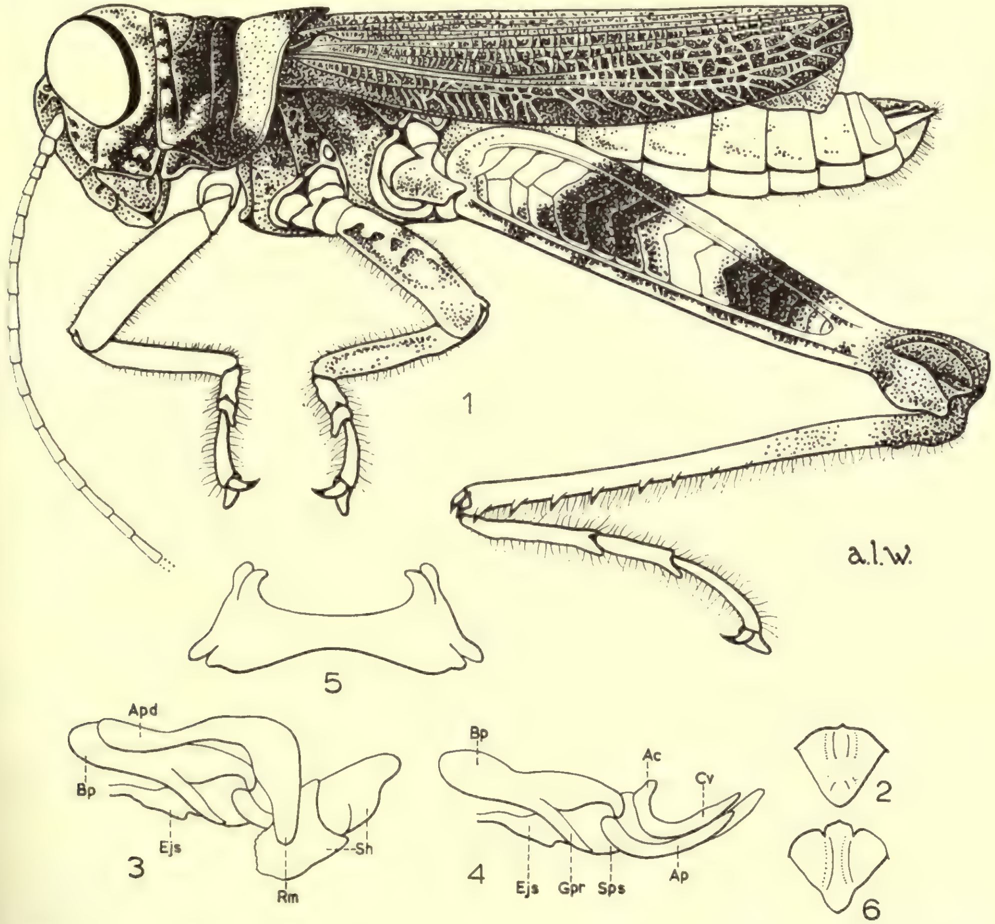

FIG. 14. *Malagasacris strateia* Rehn, 1944. 1, male, paratype. 2, male supra-anal plate. 3, phallic complex, with ectophallic membrane and epiphallus removed. 4, the same, with most part of cingulum removed. 5, epiphallus. 6, male supra-anal plate of *Malagasacris rugosa* sp. n.

Rehn (1944), describing *Malagasacris strateia*, designated the male as the type and a female as the allotype; however, it is doubtful whether the female belongs to the same genus as the male.

Malagasacris strateia Rehn, 1944

(Text-fig. 14)

♂. Integument rugose and shiny. Fastigium of vertex moderately wide. Dorsum of pronotum crossed by four sulci. Prosternal process tubercle-like. Last abdominal tergite without projections. Supra-anal plate angular. General coloration brownish. Lateral lobe of pronotum with wide, bright yellow stripe along posterior margin. Membrane of elytron bluish, with light, brownish venation and reticulation; hind wing bluish, with infumate external margin. Hind femur on both sides bright yellow, on external side with two, on internal side with one blackish transverse fasciae; knee brown; hind tibia reddish brown; tarsus reddish.

Length of body ♂ 15·3–17·2; pronotum 3·3–3·6; elytron 10·7–11·2; hind femur 10·2–11·2 mm.

Only the originally described species from Rogez Distr. is known.

Malagasacris rugosa **sp. n.**

(Text-fig. 14)

♂. Type. Integument strongly rugose, matt. Fastigium of vertex wide. Dorsum of pronotum crossed by three sulci. Prosternal process compressed with subacute apex. Last abdominal tergite with a pair of acute projections. Supra-anal plate angular with attenuate apex. General coloration brownish. Membrane of elytron bluish, with light brownish venation and reticulation; hind wing bluish, with widely infumate external margin. External side of hind femur pale ochraceous, with basal margin black and two wide black transverse fasciae, knee brown, with yellowish lower lobe; internal and lower side blue, with two not very clear whitish transverse fasciae; hind tibia blue; tarsus brownish.

Length of body ♂ 16·6; pronotum 3·7; elytron 12; hind femur 10 mm.

Madagascar Est: Moramanga, Ankasoka, 1,130 m., i.1959, 1 ♂ type (P. Griveaud). In Paris Museum.

The two species of the genus are easily distinguishable by the following main characters:

1 (2) Prosternal process tubercle-like, with rounded apex. Last abdominal tergite of male without projections. Supra-anal plate simple, angular. Internal and lower sides of hind femur yellow; tibia reddish brown . . . . . ***strateia***

2 (1) Prosternal process compressed, with subacute apex. Last abdominal tergite of male with a pair of acute projections. Supra-anal plate angular, with attenuated apex. Internal and lower sides of hind femur blue; tibia blue . ***rugosa***

GERGIS Stål, 1875

Size medium or small. Integument finely rugose and sparsely hairy. Antenna filiform, longer than head and pronotum together. Head inflated, subglobular above; fastigium of vertex sloping forwards, obtusangular, separated from vertex by depression; interocular distance wider than basal antennal segment; frons oblique, straight, short; frontal ridge low, wide, constricted below ocellus and almost obliterated below it; eyes large, strongly convex; ocelli large. Pronotum cylindrical, without carinae; dorsum crossed by three deep sulci;

metazona half of the length of prozona, its posterior margin rounded. Prosternal process obtusely conical. Mesosternal interspace widened at apex and strongly constricted in middle; metasternal interspace inverse-triangular, closed. Elytra and wings shortened, reaching last abdominal tergite; anterior margin of elytron slightly excurved, apex rounded, venation rough, reticulation rough and sparse; stridulatory specialization of elytron strongly reduced, sometimes indistinguishable. Hind wing widened with strongly excurved external margin; cubital vein connected with medial one. Hind femur slender. Hind tibia slightly expanded in apical part; external apical spine absent. Hind tarsus more than half the length of tibia. Arolium large. Last abdominal tergite of male with a pair of large, lobiform posterior projections. Supra-anal plate elongate. Cercus long, narrow, acutely conical, slightly incurved. Subgenital plate elongate, acutely conical. Phallic organ robust. Basal and apical valves of penis disconnected, but very close. Arch of cingulum and valves of cingulum well developed. Sheath of penis large, completely covering apical valves and valves of cingulum. Epiphallus bridge-shaped, with small, angular, incurved ancorae and small lobiform lophi.

Type species: *Gergis pallidinervis* Stål, 1875.

Gergis pallidinervis Stål, 1875

(Text-fig. 15)

♂. Type (redescription). Of medium size. Apex of fastigium of vertex obtuse. Male supra-anal plate elongate-angular, with apex acutely angular and without lateral and median carinae. Cercus conical, slightly, irregularly curved. Subgenital plate conical, in profile with obtuse apex. General coloration olive-brown. Face brownish with few black dots. Antenna brownish. Pronotum with small, irregular, blackish spots. Elytra olive-brownish, with main veins ochraceous. Hind wings infumate. Hind femur on external side dirty ochraceous; lower and internal side slightly orange-red. Hind knee blackish. Hind tibia on basal half slightly orange above, the rest blackish. Tarsi reddish.

♀. As the male, but larger. Ovipositor long and slender, with valves slightly curved at apices. Subgenital plate with angular apex.

Length of body ♂ 22, ♀ 31·2; pronotum ♂ 4·3, ♀ 5·2; elytron ♂ 13·5, ♀ 14; hind femur ♂ 12, ♀ 14 mm.

Madagascar Est: 1 ♂ type. Ambila-Lemaitso, i.1957, 1 ♀ (A. R.).

Gergis minor **sp. n.**

(Text-fig. 16)

♂. Type. Small. Fastigium of vertex with angular apex. Male supra-anal plate elongate, with curved sides, with deep median sulcus, strong lateral carinulae and strong transverse suture; apex angular and attenuate. Cercus conical, slightly incurved. Subgenital plate elongate, conical in profile, with acute apex. General coloration brownish. Face ochraceous, with two transverse, brown fasciae. Antenna brownish. On head and pronotum a pair of irregular ochraceous stripes. Pleura ochraceous. Elytra brown, with ochraceous main longitudinal veins. Hind wing infumate. Anterior and middle legs ochraceous. Hind femur on external side ochraceous, internal and lower side orange-red; hind knee bluish-black; hind tibia orange-reddish on basal and brown on apical half; tarsus red. Lower side of body brown.

♀ paratype as male, but larger and less brightly coloured. (End of abdomen broken.)

Length of body ♂ 17·5–18; pronotum ♂ 3–3·2, ♀ 4·2; elytra ♂ 8·5–9, ♀ 12; hind femur ♂ 10–10·3, ♀ 12 mm.

The new species differs from *Gergis pallidinervis* in the following characters:

minor	*pallidinervis*
Size smaller	Size larger.
Fastigium of vertex with angular apex	Fastigium of vertex with obtuse apex.
Male supra-anal plate with attenuate apex and strong lateral carinulae	Male supra-anal plate with angular apex and without lateral carinulae.
Male subgenital plate elongate conical in profile with acute apex	Male subgenital plate conical in profile with obtuse apex.

Madagascar Est: Perinet, 4 ♂ (including type), 1 ♀. Forêt Nord d'Anosibe, i.1951, 1 ♂, (R. Paulian).

Type and paratypes in Paris Museum. Two ♂ paratypes in the British Museum (Natural History).

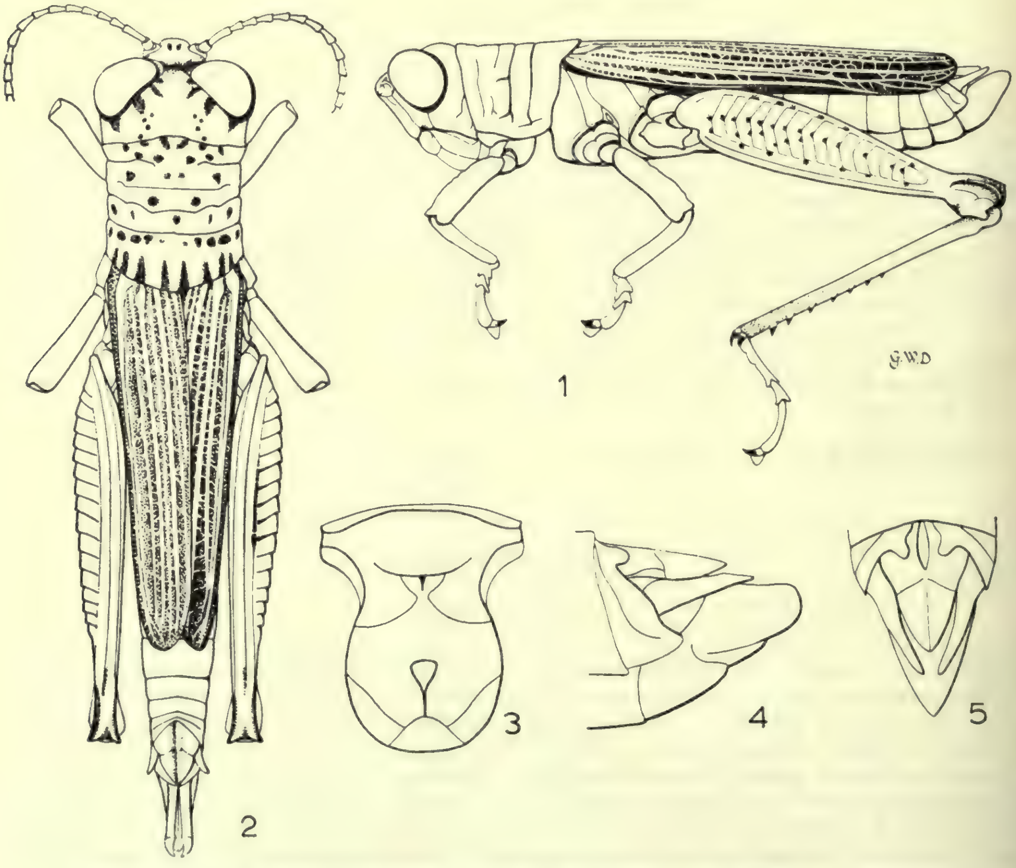

FIG. 15. *Gergis pallidinervis* Stål, 1875. 1, male type. 2, female. 3, sternum. 4, end of male abdomen, lateral view. 5, the same, from above.

PACHYCERACRIS gen. n.

Of medium size. Integument rugose. Antenna rod-like, thickened in basal part, much shorter than head and pronotum together. Head widely conical, slightly inflated, subglobular above ; fastigium of vertex horizontal, angular, convex above, with marginal carinulae, separated from vertex by depression ; inter-ocular distance wider than basal antennal segment ; frons strongly oblique, short, straight ; frontal ridge wide, convex, without lateral carinulae, distinct and tubercle-like above ocellus, obliterated below. An obtuse tubercle between base of antenna and eye. Pronotum cylindrical ; dorsum crossed by three deep sulci, metazona shorter than prozona, its posterior margin rounded ; trace of median carina noticeable in metazona only ; lateral carinae absent. Prosternal process short, tubercle-like, with wide, rounded apex ; prosternum wide ; mesosternal interspace widened at apex and strongly constricted in middle. Elytra and wings shortened, reaching eighth abdominal tergite ; transverse veinlets of radial area of elytron not specialized ; hind wing widened, with strongly excurved external margin ; cubital vein connected with media at distal end. Hind femur moderately slender. External apical spine of hind tibia absent. Hind tarsus half length of tibia. Arolium large. Ovipositor elongated, slender, with valves slightly curved at apices. (Only female known.)

Type species : *Pachyceracris fusca* sp. n.

The new genus is strikingly different from all known genera of the subfamily. A study of a male, which is unknown, may help to establish more definitely the position of the genus. Its most remarkable features are strongly shortened antenna, form of head, with tubercle-like upper part of frontal ridge, and peculiar connection of cubitus with media in hind wing.

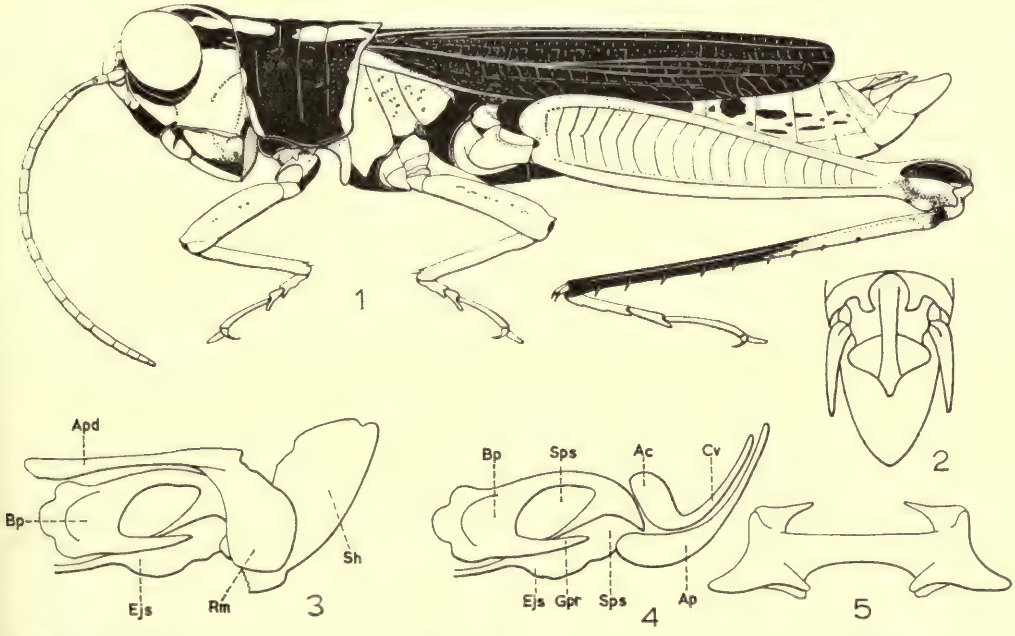

FIG. 16. *Gergis minor* sp. n. 1, male, type. 2, end of abdomen, from above. 3, phallic complex, with ectophallic membrane and epiphallus removed. 4, the same, with most of cingulum removed. 5, epiphallus.

Pachyceracris fusca sp. n.

(Text-fig. 17)

♀. Type. Integument strongly rugose, but shiny. Antenna eighteen-segmented. Metasternal interspace irregularly rounded, closed. Anterior margin of elytron slightly excurved, apex rounded ; membrane semi-transparent ; venation and reticulation rough. Subgenital plate with angular apex and a pair of pre-apical, small, round, low convexities. General coloration brownish. Hind femur ochraceous, on external side with indistinct, brownish longitudinal stripe ; hind knee brown on both sides ; hind tibia and tarsus red. Hind wing infumate.

Length of body 32 ; pronotum 5·5 ; elytron 16 ; hind femur 13 mm.

Madagascar Centre : Andranotobaka, 1,400 m., Ambatolampy, iv.1957, 1 ♀, type (P. Griveaud) in Paris Museum.

MORONDAVIA gen. n.

Small. Integument finely rugose. Antenna filiform, shorter than head and pronotum together. Head inflated, globular above ; fastigium of vertex sloping and strongly protruding forwards, angular, with obtuse apex ; interocular distance slightly narrower than basal antennal segment ; eyes large, moderately convex ; frons strongly oblique, very short, about as long as length of clypeus and labrum ; frontal ridge wide, flat, obliterated below ocellus, roundly merging with fastigium of vertex. Pronotum subcylindrical, without carinae ; three weak sulci crossing dorsum ; metazona much shorter than prozona, its posterior margin widely rounded.

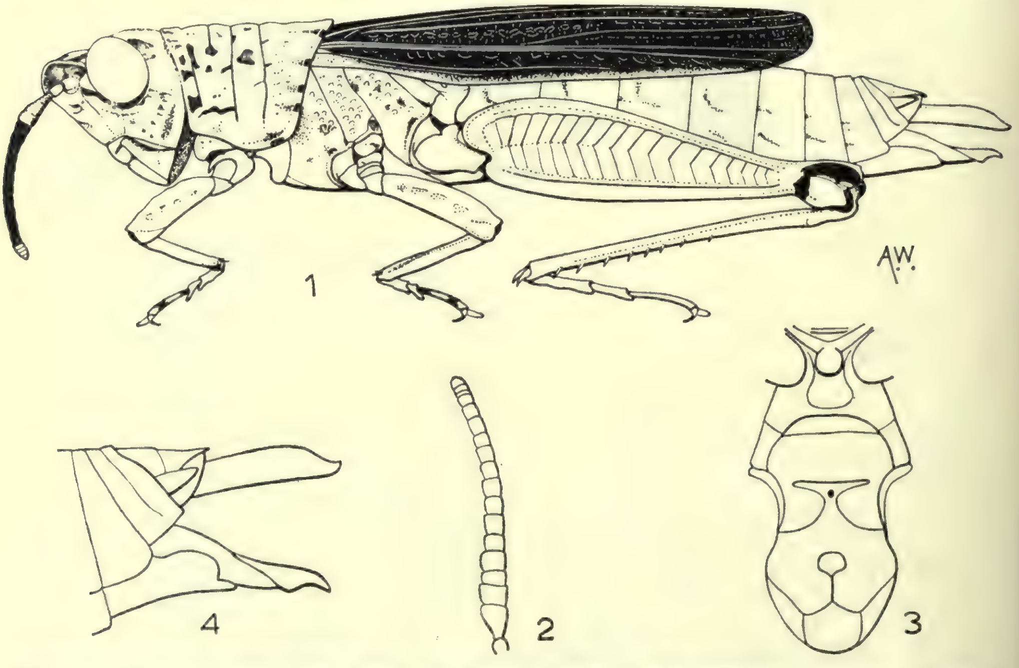

FIG. 17. *Pachyceracris fusca* sp. n. 1, female, type. 2, antenna. 3, sternum. 4, end of abdomen, lateral view.

Prosternal process short, tubercle-like, with rounded, inflated apex. Meso- and metasternum longitudinally concave ; mesosternal interspace widening at apex and strongly constricted in basal part. Elytra and wings not reaching end of abdomen ; venation of elytron rough and reduced, but in precostal and vannal areas there are rows of regular, parallel, thickened, oblique veinlets ; hind wing slightly widened, with strongly excurved posterior margin ; cubital vein connected and fused with medial vein. Hind femur moderately slender ; external apical spine of hind tibia absent ; tarsus elongated. Arolium large. Last abdominal tergite of male with a pair of small projections ; supra-anal plate elongate-angular ; cercus slender, elongated, with acute apex ; subgenital plate narrow, subconical. Phallic complex with well-developed apodeme of cingulum, with large sheath, completely covering apical valves of penis and large arch of cingulum. Basal valves of penis large ; connected with apical valves by thick flexure-like connection. Valves of cingulum small, acute. Epiphallus bridge-shaped, with narrow bridge, small ancorae and large, lobiform lophi. Female subgenital plate with acutangular apex and pair of pre-apical small, round convexities. Ovipositor elongated, with narrow valves, slightly curved at apices ; upper margin of upper valve roughly serrated.

Type species : *Morondavia cephalica* sp. n.

This genus differs strongly from other genera of the group by specialization of the elytra (possibly stridulatory), represented by rows of regular thickened veinlets in precostal and vannal areas, and by inflated head with strongly shortened frons.

***Morondavia cephalica* sp. n.**

(Text-fig. 18)

♂. Type. Head strongly inflated ; fastigium of vertex broadly angular. Cercus strongly incurved ; supra-anal plate with parabolic apex. General coloration ochraceous-brownish, with ochraceous spots on lateral lobes of pronotum and pleura. External side of hind femur, in male, ochraceous, with two infumate transverse fasciae ; internal and lower side red with blackish pre-apical fascia ; hind tibia on lower side of basal part reddish, the rest of it on all sides blackish ; hind tarsus red.

♀. Paratype. Larger than male, with slightly less inflated head. General coloration as in male, but ochraceous pattern on lateral lobes of pronotum more definite. External side of hind femur without fasciae ; internal side with only trace of pre-apical fascia. Hind tibia red.

Length of body ♂ 20, ♀ 24 ; pronotum ♂ 3·5, ♀ 3·7 ; elytron ♂ 12, ♀ 11·4, hind femur ♂ 10, ♀ 10·5 mm.

Madagascar Ouest : Antsingy N., 63 km. East Maintirano Forest, vii.1949, 1 ♂ type (R. Paulian) ; forêt de l'Ankarafantsika, Ampijoroa, xii.1951, 1 ♀ paratype. Type and paratype in Paris Museum.

***Morondavia minor* sp. n.**

(Text-fig. 18)

♂. Type. Differs from *M. cephalica* by smaller size, slightly less inflated head ; narrow fastigium of vertex ; straight male cercus, supra-anal plate of male with angular and slightly attenuate apex and by tibia red in both sexes.

Length of body ♂ 10–12, ♀ 22 mm.

Madagascar Ouest : Morondava, forêt S. de Befasy, i.1956, 1 ♂ type, 2 ♀ (R. Paulian).

Madagascar Nord : Montagne d'Ambre, Joffreville, xii.1947, 1 ♂ (P. Cachan).

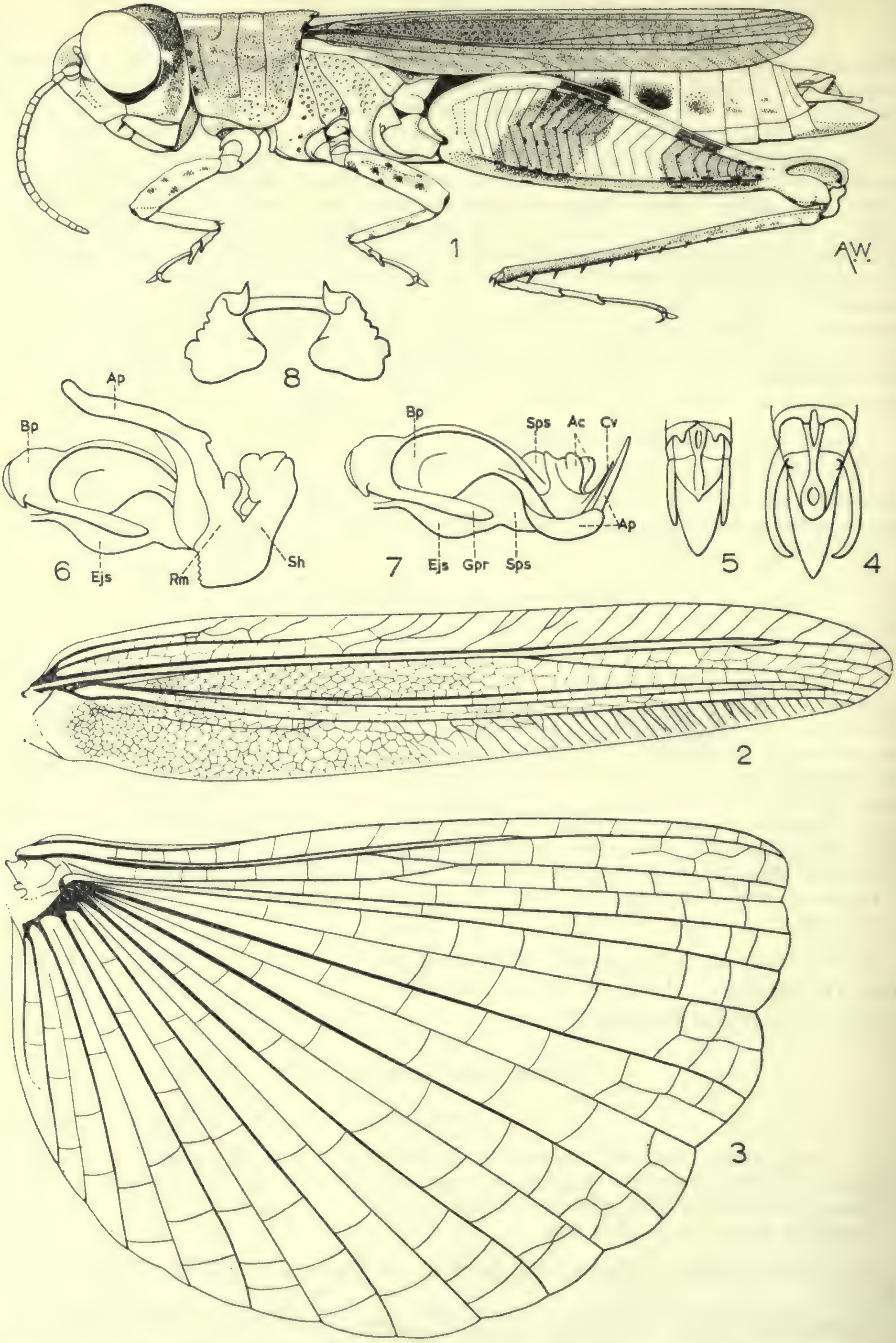
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FIG. 18. 1–4, *Morondavia cephalica* sp. n. 1, male, type. 2, elytron. 3, hind wing. 4, end of male abdomen, from above. 5–8, *Morondavia minor* sp. n. 5, end of male abdomen, from above. 6, phallic complex, with ectophallic membrane and epiphallus removed. 7, the same, with most part of cingulum removed. 8, epiphallus.

Type and paratype in Paris Museum. 1♂, 1♀ paratypes in the British Museum (Natural History).

Subfamily **OXYINAE**

OXYA Serville, 1831

Oxya humeralis (Walker, 1870)

(Text-fig. 19)

Heteracris humeralis Walker, 1870 : 662.
Oxya humeralis (Walker, 1870) Willemse, 1925 : 39.

This species was described as *Heteracris humeralis* Walker, 1870 from a single female type from Madagascar preserved in the British Museum (Natural History) and still in reasonably good condition.

Willemse in 1925 synonymized this species with *Oxya hyla* Serville, 1831 on the basis of the structure of the female subgenital plate and the general pattern of coloration, which is, in any case, almost the same in all species of the genus.

Oxya hyla Serville, the type of which is lost and the type locality Senegal, has been recorded from almost the whole of tropical Africa, but a preliminary study of African material suggests that several different species may be involved. Therefore, until *Oxya hyla* Serville is redefined and a neotype designated, Walker's species must be regarded as valid.

♂. Supra-anal plate trilobate, with lateral lobes short and small, and the apical lobe large, angular. Cercus slightly compressed, in lateral view with almost straight lower and oblique and slightly excurved upper margin, apical part of which is slightly oblique, apex subacute. Subgenital plate short, narrow, subconical. Phallic complex rather slender. Sheath of penis absent ; basal and apical valves of penis connected by thin strongly sclerotized flexure ; valves of cingulum large ; arch of cingulum low, robust. Epiphallus bridge-shaped, with bridge divided ; ancorae small, lophi lobiform or tooth-like. General coloration green or greenish, with brown lateral stripe running from eyes, through lateral lobes of pronotum and along elytron. Hind femur on all sides green or greenish ; hind knee brown or brownish ; hind tibia blue.

♀. As male, but larger. Subgenital plate at apex with two acute teeth and a pair of strongly toothed, slightly incurved lateral ridges. Ovipositor slender ; upper valves on external side slightly serrated ; lower valves on external sides with acute large teeth. Pattern and coloration as in male.

Length of body ♂ 21–25·5, ♀ 26–31 ; pronotum ♂ 4·4–5·6, ♀ 5–6·8 ; elytron ♂ 15–23, ♀ 20·5–28 ; hind femur ♂ 12·3–14·8 mm.

This species is highly variable in body size and relative length of elytra, which may exceed end of abdomen by about one to one and a half times the length of pronotum.

Madagascar Centre : Tananarive Tsimbazaza, ii.1949, 2 ♀ (R. Paulian).

Madagascar Est : Sambava, Marojejy, Ambinanitelo, 500 m., xii.1958, 1 ♂, 2 ♀ (E. Raharizonina) ; forêt de Tampolo, vii.1949, 2 ♂ (J. Millot) ; Tamatave, Fanandrana, iii.1959, 1 ♂ (E. Razafimandimby) ; station agricole de l'Ivoloina, xi.1958, 1 ♀ (J. Elie) ; forêt Nord d'Anosibe, i.1957, 1 ♀ (R. Paulian) ; Brickaville, station agricole, 1 ♀.

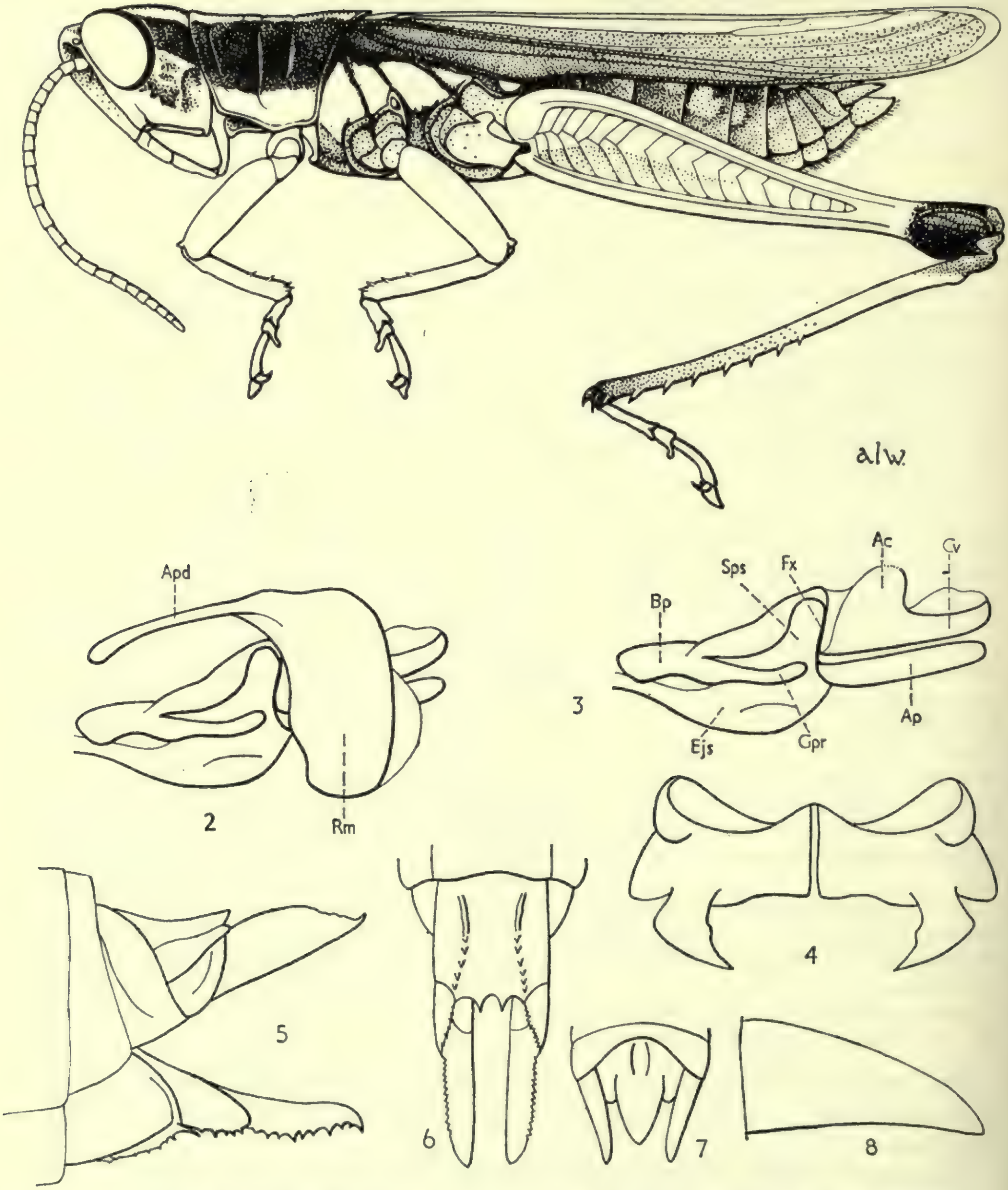
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FIG. 19. *Oxya humeralis* (Walker, 1870). 1, male. 2, phallic complex, with ectophallic membrane and epiphallus removed. 3, the same, with most part of cingulum removed. 4, epiphallus. 5, end of female abdomen, lateral view. 6, the same, from below. 7, end of male abdomen, from above. 8, male cercus.

Madagascar Ouest : Ambilobe, iv.1957, 1 ♂ (R. Paulian) ; forêt de l'Ankarafantsika, Ampijoroa, 1 ♀ ; Antsalova, forêt de l'Antsingy, Andobo, ii.1957 1 ♂ (P. Griveaud).

Madagascar Sud Ouest : station agricole du Bas Mangoky, 1 ♀ ; Tuléar Saint Augustin, ii.1956, 1 ♀ (A. Robinson).

Subfamily **COPTACRIDINAE**

PAMPHAGELLA Bruner, 1910

Of medium size. Integument granose. Antenna compressed, slightly widened on basal and apical part, shorter than head and pronotum together. Fastigium of vertex narrow, strongly sloping forwards and obtusangularly merging with frontal ridge. Interocular distance wider than basal antennal segment ; frons oblique, straight, frontal ridge narrow, between antennae slightly widened ; slightly concave, with sharp lateral carinulae, vertex in profile angular. Pronotum strongly tectiform, in female almost crest-shaped, crossed by three sulci ; metazona much shorter than prozona, its posterior margin acutangular. Prosternal process low, transverse, with widely rounded apex. Mesosternal interspace short, much wider than its length. Elytra lobiform, lateral, covering large tympanum ; precostal area expanded ; apex rounded ; venation and reticulation rough. Hind femur short and wide ; upper carina strongly serrated ; lower external area located on ventral side ; lower lobe of hind knee rounded. External apical spine of hind tibia absent. Arolium of moderate size. Male supra-anal plate elongate-angular. Cercus compressed, angular, upcurved, with irregularly serrated upper margin. Subgenital plate short, subconical. Female subgenital plate slightly trilobate. Ovipositor short, with robust valves, slightly curved at apices.

Type species : *Pamphagella comoroensis* Bruner, 1910.

This genus was described originally as a member of the family Pamphagidae, but it was proved (Dirsh, 1958) to belong to the family Acrididae and most probably to the subfamily Coptacridinae. Since, however, the only known male type is in poor condition, not allowing a study of its phallic organ, the subfamily relationship of the genus is doubtful.

Pamphagella comoroensis Bruner, 1910

(Text-fig. 20)

Antenna fourteen-segmented. Pronotum of male less tectiform than in female. General coloration brown. Lower and internal side of hind femur reddish.

Length of body ♂ 13·5, ♀ 24·5–25 ; pronotum ♂ 3·4, ♀ 7–8 ; elytron ♂ 2·5, ♀ 4–5·5 ; hind femur ♂ 7·2, ♀ 10–11 mm.

Madagascar Sud-Ouest, Sept Lacs 50 m. Tuléar, vi–vii.1958, 1 ♀, (A. R.). Type locality : Comoro Is., Circle de Bombao, 1 ♂, 1 ♀. ♂ type in Berlin Museum.

Subfamily **CALLIPTAMINAE**

CALOPTENOPSIS I. Bolivar, 1889

Caloptenopsis decisa (Walker, 1870)

(Text-fig. 21)

Caloptenus decisus Walker, 1870 : 700.
Caloptenus baliensis Brancsik, 1893 : 195, **syn. n.**
Caloptenopsis madagascariensis Sjöstedt, 1918 : 16, **syn. n.**

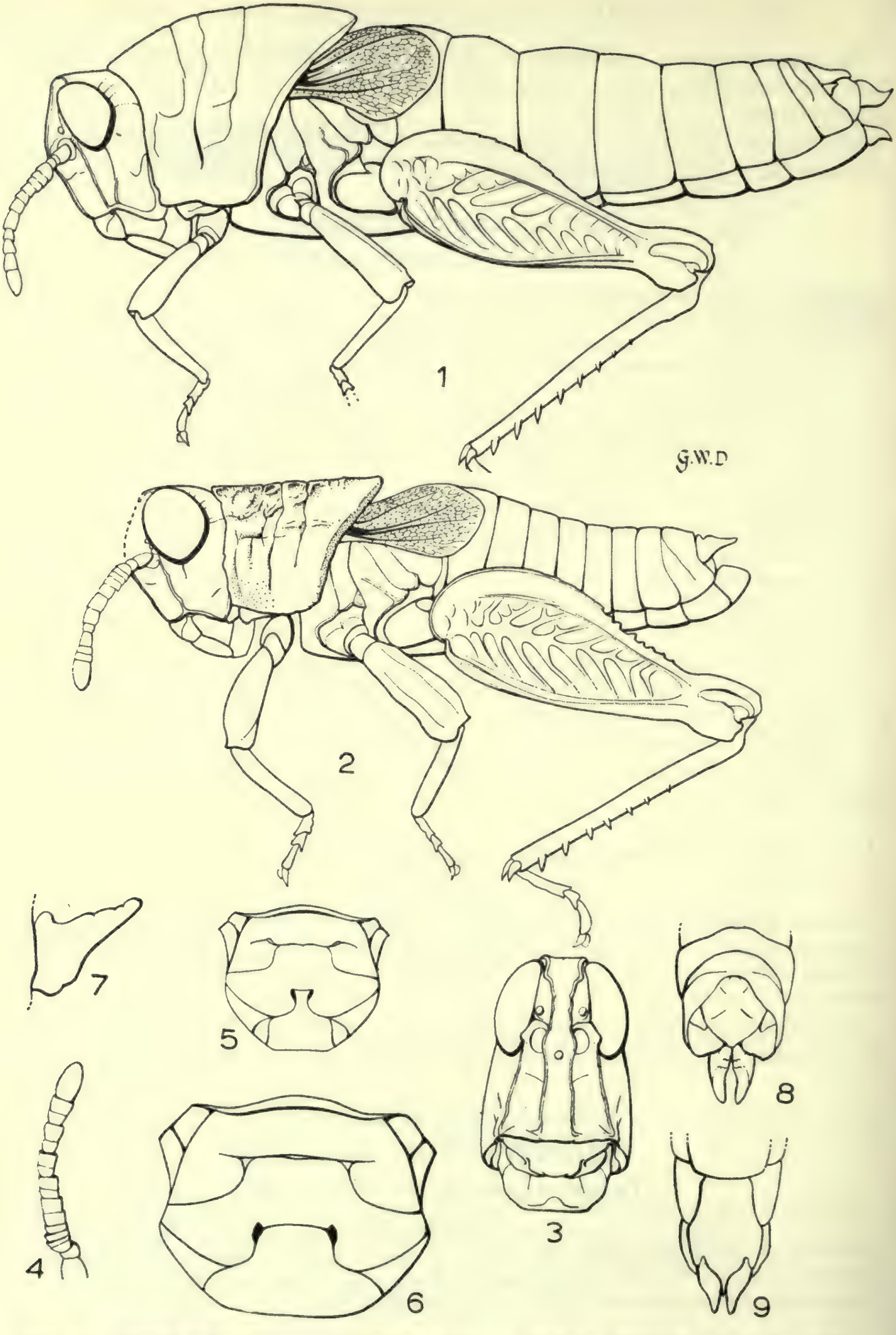

FIG. 20. *Pamphagella comoroensis* Bruner, 1910. 1, female, paratype. 2, male, type. 3, face. 4, male antenna. 5, male sternum. 6, the same, female. 7, male cercus. 8, end of female abdomen, from above. 9, the same, from below.

The types of *C. decisus* Walk. and *C. madagascariensis* Sjös. were compared and found identical. The type of *C. baliniensis* Branc. is lost, but the description fully agrees with the types of the above-mentioned species.

♂. Of medium size and comparatively slender for the genus. Lateral carinae of pronotum slightly regularly excurved ; posterior margin of pronotum obtusangular, with slightly incurved sides of the angle. Prosternal process slightly flattened in front. Elytra exceed end of abdomen, comparatively narrow. Hind femur widened, with moderately expanded lower margin. Internal spur of internal side of hind tibia elongated, with moderately curved apex and dense hairs. Male supra-anal plate elongate, acutely angular, with median longitudinal sulcus and slightly upcurved sides. Cercus comparatively long and narrow, slightly incurved,

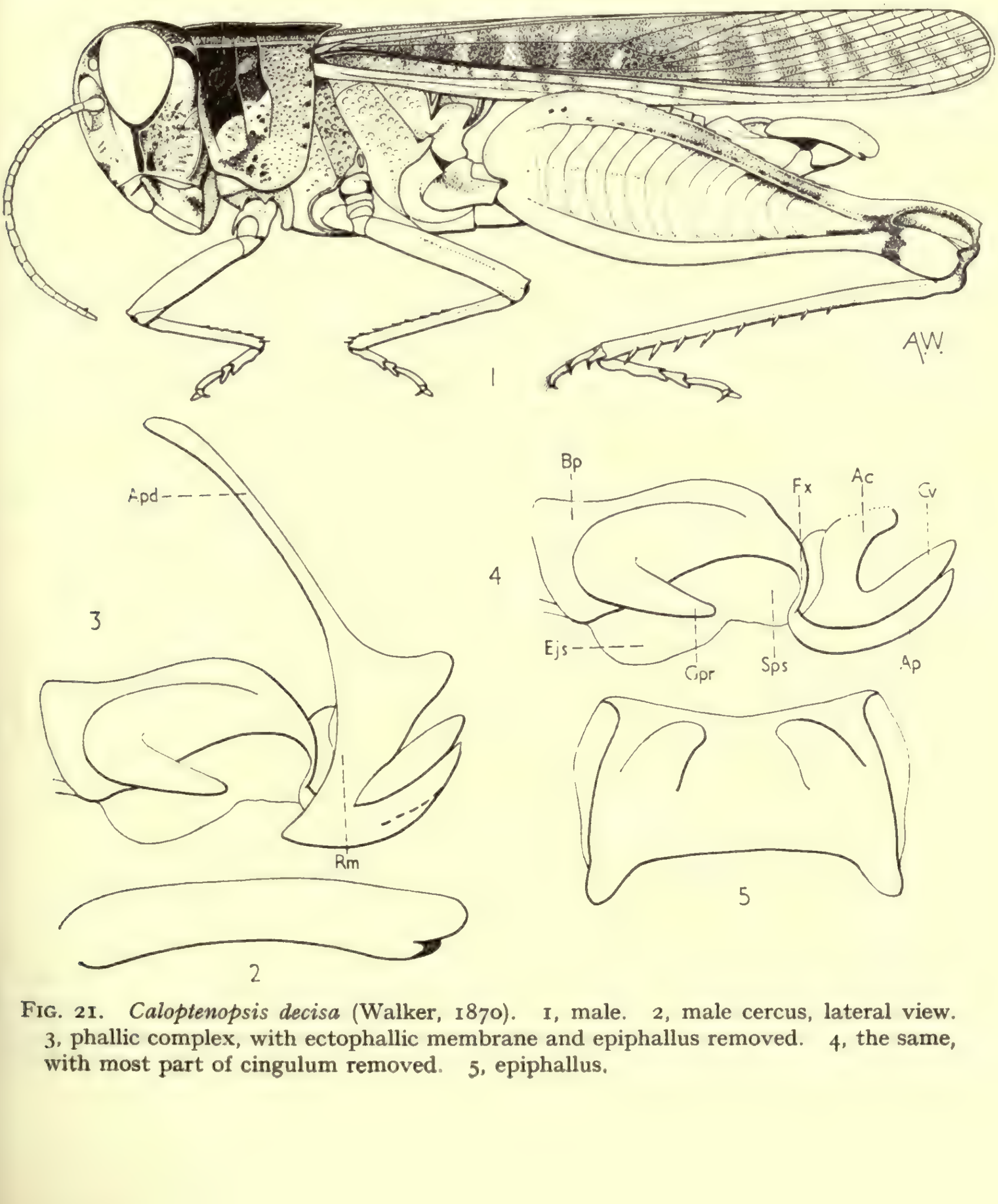

FIG. 21. *Caloptenopsis decisa* (Walker, 1870). 1, male. 2, male cercus, lateral view. 3, phallic complex, with ectophallic membrane and epiphallus removed. 4, the same, with most part of cingulum removed. 5, epiphallus.

with long, comparatively narrow upper and long narrow, subacute lower lobe. Subgenital plate short, subconical. Phallic complex robust. Apodemes long, narrow; valves of penis robust, with thick flexure; gonopore process short; arch of cingulum and valve of cingulum large, robust. Epiphallus trapezoidal; ancorae short, robust.

General coloration brown. Elytron with few ochraceous spots in medial area and on apical part. Internal side of hind femur dark brown, with pre-apical ochraceous fascia, above with two faint fasciae; upper lobe of hind knee blackish or brown with blackish prebasal spot, lower lobe ochraceous. Hind tibia greyish or brownish; with slight purplish or bluish tinge.

♀. As the male, but larger. Ovipositor short, with robust valves, curved at apices.

Length of body ♂ 21–22, ♀ 27–32; pronotum ♂ 4·4–4·6, ♀ 5–5·2; elytron ♂ 17·2–18, ♀ 22·5–26; hind femur ♂ 13·5–14, ♀ 17·9–19·2 mm.

Madagascar Centre: Tananarive Tsimbazaza, vii.1948, 1 ♂, 3 ♀ (P. Cachan); Arivonimamo, x.1948, 1 ♀ (E. Razafimandimby); Ambatofinandrahana, vii.1957, 2 ♂, 2 ♀ (P. Griveaud).

Madagascar Sud: Morombe, lac Iotry, 40 m., vii.1957, 1 ♀ (P. Griveaud); Beloha, 100 m., vi.1957, 1 ♀; La Sakoa, 1 ♀ (R. P. Cattala).

Subfamily EYPREPOCNEMIDINAE

The subfamily Eyprepocnemidinae is abundantly represented in Madagascar, and several genera and species described below are endemic in the island. Another interesting point is that all Madagascar species of this subfamily manifest a wide range of variability in pattern and coloration, suggesting that they probably are in a progressive stage of evolution on this island.

Key to Genera

1 (2) Male cercus with acute apex (Text-fig. 22) . . . ***EYPREPOCNEMIS*** (p. 314)
2 (1) Male cercus with widened rounded apex.
3 (4) Elytra lobiform, lateral (Text-fig. 23) . . . ***MALAGACETRUS*** (p. 316)
4 (3) Elytra fully developed or shortened but not lobiform.
5 (8) Antenna filiform or almost filiform with slightly widened medial part.
6 (7) Lateral carinae of pronotum obliterated. General coloration black with red pattern (Text-fig. 24) . . . . ***TENEBRACRIS*** (p. 318)
7 (6) Lateral carinae of pronotum distinct. General coloration not black, without red pattern (Text-figs. 25–28) . . . . . . ***HETERACRIS*** (p. 319)
8 (5) Antenna strongly ensiform (Text-fig. 29) . . . . ***HORAEOCERUS*** (p. 324)

EYPREPOCNEMIS Fieber, 1853

Eyprepocnemis brachyptera Bruner, 1910

(Text-fig. 22)

♂. Of medium size. Antenna filiform, shorter than head and pronotum together. Fastigium of vertex parabolic, concave; vertex with median carinula; frontal ridge very slightly narrowing towards apex. Lateral carinae of pronotum straight, diverging backwards, in metazona almost obliterated. Prosternal process subcylindrical, with apex oblique towards front. Mesosternal interspace narrow, twice as long as its width. Elytra shortened, reaching sixth abdominal tergite. Cercus narrow, with acute, downcurved, slightly compressed apex. General coloration brownish ; longitudinal spot on dorsum of pronotum narrow, dark brown ; lateral lobe, in middle, with blackish irregular spot, in middle of which there is ochraceous callous convexity ; lower and lower internal part of hind femur orange-red ; base of hind knee with black transverse fascia, upper lobe black, apical part of lower lobe light ochraceous ; basal half of hind tibia blue with two whitish rings, apical half red ; spines of the same colour as tibia, with blackish apices.

♀. As the male, but larger. Elytra shortened or reaching end of abdomen. Subgenital plate trilobate. Ovipositor robust, with short, curved valves.

Length of body ♂ 17–20, ♀ 28–33 ; pronotum ♂ 3·6–4·7, ♀ 5·4–6·5 ; elytron ♂ 9–14, ♀ 13–20 ; hind femur ♂ 11–14, ♀ 12·5–21 mm.

E. brachyptera varies in body size and relative length of elytra, which in some specimens reach the sixth abdominal tergite, in others exceed end of abdomen.

The species is quite distinct from any African short-winged species.

Madagascar Centre : Ambositra, forêt d'Ankazomivady, 1,640 m., vii.1957 5 ♂, 6 ♀ (A. Robinson) ; Ambalavao, Andringitra, plateau Soaindrano, 2,090 m., 15.i.1958, 1 ♀ (R. Paulian) ; Tsarazafy, 15.vii.1913, 2 ♀ (R. Beck).

Eyprepocnemis smaragdipes Bruner, 1910

Euprepocnemis smaragdipes Bruner, 1910 : 643.
Euprepocnemis malagassus I. Bolivar, 1914 : 11 ; Dirsh, 1958 : 41.

♂. Of medium size. Antenna filiform, about as long as head and pronotum together. Fastigium of vertex angular, almost parabolic, with obtuse apex, above slightly concave, with strong median carinula ; frontal ridge slightly narrowing towards apex. Dorsum of pronotum

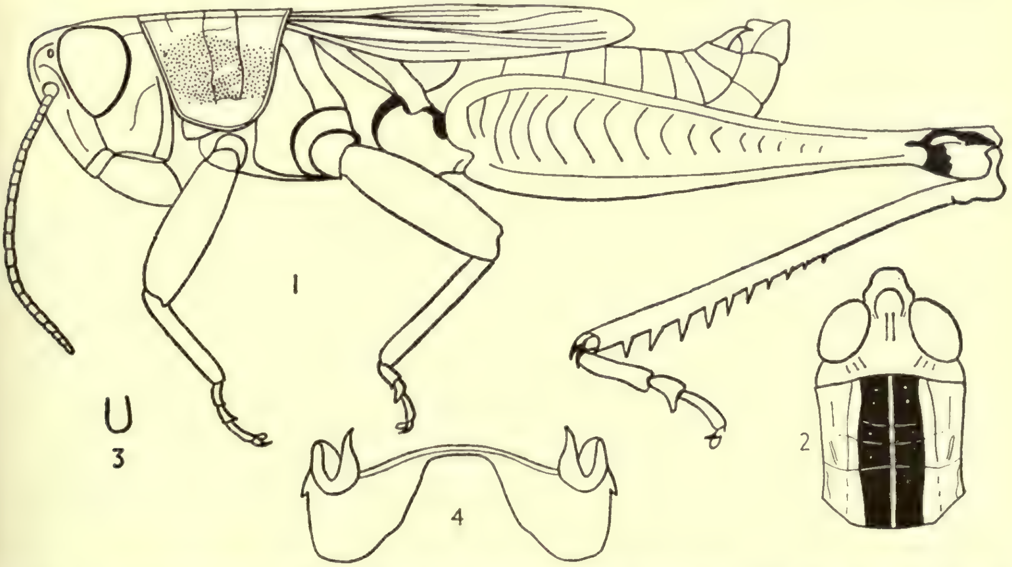

FIG. 22. *Eyprepocnemis brachyptera* Bruner, 1910. 1, male, type. 2, head and pronotum from above. 3, prosternal process, frontal view. 4, epiphallus.

slightly raised in prozona ; median carina sharp ; lateral carinae obtuse, straight, diverging backwards and almost obliterated in metazona ; prozona longer than metazona. Prosternal process subcylindrical, with rounded apex. Mesosternal interspace about as long as wide. Elytra and wings fully developed, exceeding end of abdomen. Cercus narrow, in apical part compressed and slightly downcurved. General coloration brownish ; longitudinal spot on dorsum of pronotum narrow, dark brown ; lateral lobe of pronotum with brownish, oblique, longitudinal stripe on brownish ochraceous background ; external side of hind femur from brownish to ochraceous-brown, internal side dark brown, lower surface ochraceous ; hind tibia greenish, bluish, greenish grey, sometimes slightly reddish on apical part ; spines whitish, with black tips. Epiphallus as in Text-fig. 22.

♀. As the male, but larger. Elytra reach or exceed end of abdomen. Subgenital plate trilobate. Ovipositor robust, with curved valves.

Length of body ♂ 22·5–25·5, ♀ 27–37 ; pronotum ♂ 4·8–5·2, ♀ 5·2–7 ; elytron ♂ 19–19·6, ♀ 21·5–26·2 ; hind femur ♂ 14·3–15·5, ♀ 17–23.

E. smaragdipes varies in body size, relative length of elytra and coloration of hind tibia, which is bluish grey, greenish grey and sometimes bluish grey at the basal part and reddish in apical part ; there are all intermediate forms between them.

E. smaragdipes is nearest to *E. kalkudensis* Henry, 1937 from Ceylon.

It is probable that records of *E. plorans* from Madagascar by Saussure, 1899 and Brancsik, 1893 refer to *E. smaragdipes*, since *plorans* was never again recorded from the island.

Madagascar Centre : Tananarive Tsimbazaza, 13.xi.1947, 1 ♀ (R. Paulian) ; Manjakandriana, Ankadimanga, xii.1957, 2 ♀ (J. Elie).

Madagascar Est : Ile Sainte Marie, Ambatoroa, v.1959, 3 ♂, 1 ♀. (E. Razafimandimby) ; Tamatave, iv.1959, 2 ♂, 1 ♀ (E. Razafimandimby) ; Perinet, 2 ♀ ; Ifanadiana, Ranomafand, 1 ♂, 1 ♀ (R. Paulian).

Madagascar Sud : lac Tsimanampetsotsa, v.1959, 1 ♀ (R. Paulian). Iles Comores : Moroni, 2.iv.1948, 1 ♀ (P. Cachan).

MALAGACETRUS gen. n.

Of medium size. Integument rugose. Antenna filiform, half again as long as head and pronotum together. Fastigium of vertex narrow, angular, with obtuse apex, roundly merging with frontal ridge, obtuse lateral and median carinulae present ; frons oblique ; frontal ridge flat, without lateral carinulae, narrowed at apex. Pronotum slightly tectiform ; median and lateral carinae obtuse, lateral carinae irregular and slightly diverging backwards ; three deep sulci crossing dorsum ; metazona much shorter than prozona, its posterior margin obtusangular. Prosternal process obtusely conical. Mesosternal interspace wider than its length. Elytra lobiform, lateral, reaching second abdominal tergite and covering tympanum, its anterior margin strongly excurved and apex subacute. Hind femur moderately robust. Arolium large. Last abdominal tergite with a pair of acute projections. Supra-anal plate elongate, with obtusely angular apex. Cercus exceeds end of subgenital plate, widened, in apical half strongly lamelliformly compressed and downcurved, with apex rounded. Paraproct with rounded lower apical projection. Subgenital plate short, in profile rounded.

Only male known.

Type species : *Paracaloptenus rubripes* Chopard, 1919.

Malagacetrus rubripes (Chopard, 1919), **comb. n.**

(Text-fig. 23)

Paracaloptenus rubripes Chopard, 1919 : 154.

General coloration dark brown. Antenna very long, with alternate brown and yellowish rings. In front and behind eyes yellow vertical stripes present. Pronotum uniformly blackish brown. All legs bright cinnabar-red ; hind femur on upper side with three slight, brownish fasciae ; hind knee black ; hind tibia at base black, the rest with spines and tarsus cinnabar-red. Apical half of cercus reddish.

Betsimisaraka du Centre, 1 ♂ type.

The species was described originally as *Paracaloptenus*, but study of the type showed that the shape of cercus, end of abdomen, pronotum and head are as found in Eyprepocnemidinae, and not in *Paracaloptenus*. In Eyprepocnemidinae however there is no genus into which *rubripes* could be included and a new genus had to be erected. It can be placed near *Heteracris*, from which it differs strongly by micropterism and general shape of body.

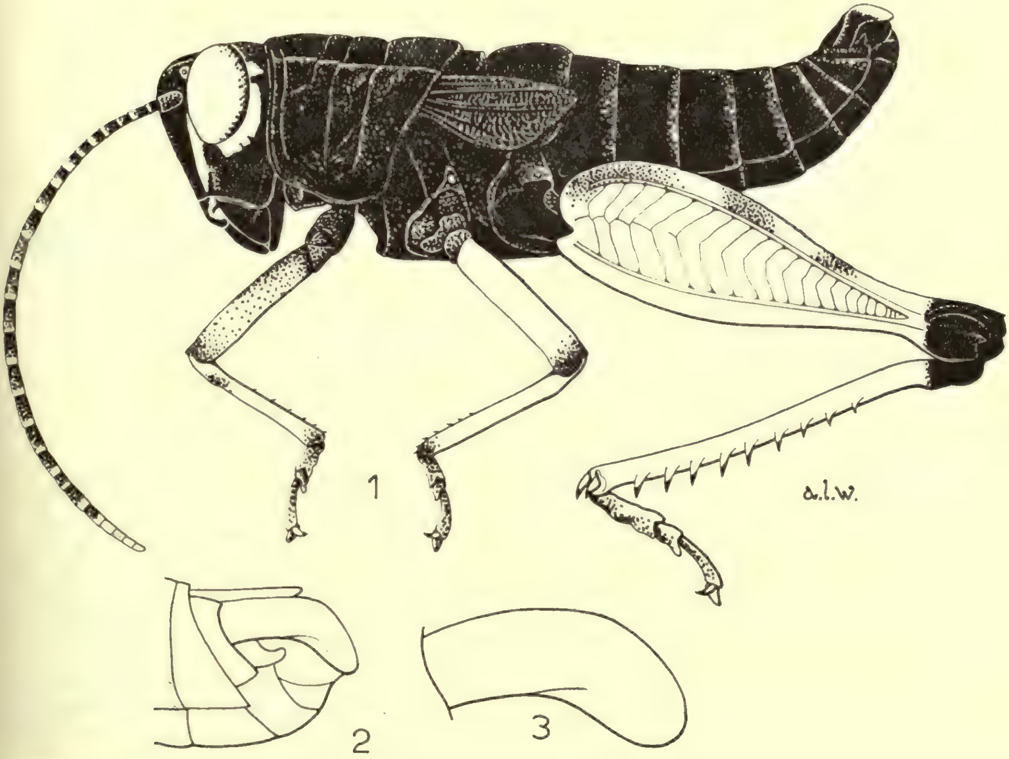

Fig. 23. *Malagacetrus rubripes* (Chopard, 1919). 1, male, type. 2, end of male abdomen, lateral view. 3, male cercus.

TENEBRACRIS gen. n.

Of medium size. Integument rugose. Antenna filiform, longer than head and pronotum together. Fastigium of vertex widely angular with truncate apex, edged by low lateral carinulae, median carinula continuous with occipital one. Frons in profile oblique; frontal ridge low, flat, with small depression under ocellus and rugulose surface; gradually narrowing at apex. Pronotum weakly tectiform with distinct median and fully obliterated lateral carinae. Three deep transverse sulci crossing dorsum; metazona shorter than prozona, with obtusangular posterior margin. Prosternal process subconical, with obtuse, rounded apex. Elytra and wings fully developed, exceeding end of abdomen; membrane thick semi-transparent, reticulation dense. Hind femur comparatively robust. Spines of hind tibia sparse. Last abdominal tergite of male with a pair of angular projections. Supra-anal plate elongate angular. Cercus strongly compressed and widened in apical half, with in- and down-curved, rounded apex. Subgenital plate short, rounded. Epiphallus with moderately wide bridge, small incurved ancorae and large multi-lobate lophi.

Type species: *Tenebracris splendens* sp. n.

The new genus has no close affinity with any known genera of Eyprepocnemidinae, but may be placed near *Heteracris*, with which it shares filiform antenna and shape of cercus, but from which it differs strongly by the obliterated lateral carinae of pronotum and by shape of fastigium of vertex.

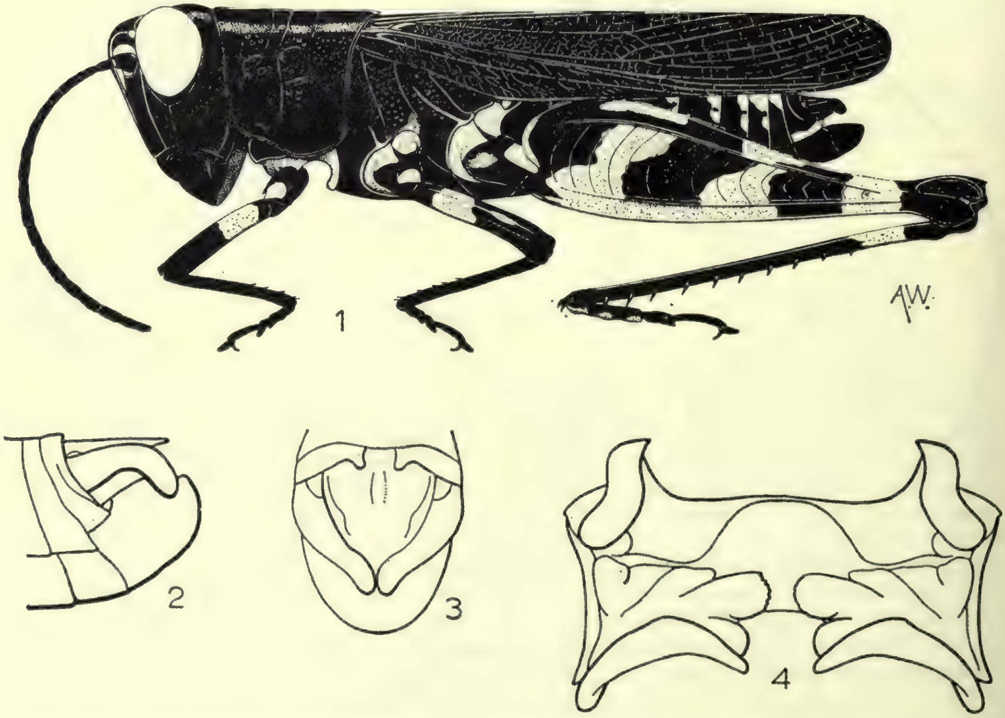

FIG. 24. *Tenebracris splendens* sp. n. 1, male, type. 2, end of male abdomen, lateral view. 3, the same, from above. 4, epiphallus.

Tenebracris splendens **sp. n.**

(Text-fig. 24)

♂. Type. Black, with faintly marked pair of dark brown lateral stripes on dorsum of pronotum. Palpi whitish. Wing deep blue, with apex of remigium infumate. Anterior and middle femur with cinnabar-red rings near base. Both sides of hind femur cinnabar-red, with three black fasciae and black knee ; hind tibia black with cinnabar-red ring at post-basal part.

Female unknown.

Length of body 27 ; pronotum 6·2 ; elytron 19 ; hind femur 17 mm.

Madagascar Centre : Ambatolampy, Andranotobaka, 1,400 m., vi.1957, 1 ♂, paratype (P. Griveaud).

Madagascar Ouest : Antsalova, forêt de l'Antsingy, Andobo, 190 m., ii.1957, 1 ♂, type (P. Griveaud).

Type in Paris Museum, paratype in the British Museum (Natural History).

HETERACRIS Walker, 1870

Heteracris Walker, 1870 : 655.
Thisoicetrus Brunner, 1893 : 150 ; Dirsh, 1958 : 53.
Bibulus I. Bolivar, 1914 : 31 ; Popov, 1950 : 133.

Key to Madagascar Species

1 (8) Elytra and wings fully developed, exceeding end of abdomen.
2 (7) Dorsum of pronotum with dark longitudinal stripe.
3 (4) External side of hind femur with two dark, wide, transverse fasciae (Text-fig. 25) ***finoti*** I. Bolivar
4 (3) External side of hind femur on basal half with narrow longitudinal dark stripe near upper carinula and small spot on apical half (Text-fig. 26), or with numerous small spots (Text-fig. 27).
5 (6) External side of hind femur on upper basal half with dark, narrow stripe and small spot on apical half. Lower angle of paraproct in male narrow (Text-fig. 26) ***sikorai*** I. Bolivar
6 (5) Pattern on external side of hind femur disintegrated into numerous dark, small spots (Text-fig. 27). Lower angle of paraproct in male wide (Text-fig. 27) ***zolotarevskyi*** sp. n.
7 (2) Dorsum of pronotum without dark longitudinal stripe . . ***nobilis*** Brancsik
8 (1) Elytra and wings short, reaching base of supra-anal plate (Text-fig. 28) ***reducta*** sp. n.

Heteracris finoti (I. Bolivar, 1914), **comb. n.**

(Text-fig. 25)

Thisoicetrus finoti I. Bolivar, 1914 : 2.
Thisoicetrus praestans Carl, 1916 : 500, **syn. n.**

The two species, *finoti* and *praestans*, were described from males and females. I am designating here the males as types for them both. These were compared and found identical, a slight difference in pattern on the external side of the hind femur not exceeding the range of individual variability.

♂. Large. Antenna longer than head and pronotum together, slightly thickened in middle part. Fastigium of vertex narrowing towards apex and merging roundly with frontal ridge, convex above, with strong median carinula ; frontal ridge narrowed above antennae. Median carina of pronotum high and sharp ; lateral carinae straight, almost parallel, only slightly diverging backwards ; dorsum slightly tectiform, more so in prozona than in metazona. Prosternal process subconical, slightly antero-posteriorly compressed with obtuse apex. Mesosternal interspace longer than its width. Elytra and wings fully developed. Cercus with strongly compressed, moderately widened, in- and down-curved apical half, with apex rounded. Lower angle of paraproct narrowed and protruding backwards. Subgenital plate very short, rounded in profile. General coloration brownish olive-green. Apical part of antenna ochraceous. Head ochraceous above and with blackish stripes on sides below eyes ; labrum with a pair of red spots on sides. Dorsum of pronotum with narrow, longitudinal, parallel-sided, blackish stripe. Elytra uniformly olive-green, with dorsal part lighter than lateral. Wings blue, with infumate apex. Hind femur ochraceous with large longitudinal basal blackish spot, transverse blackish fascia in apical half and blackish knee on both sides ; above with two blackish fasciae. Hind tibia with base black, followed by yellow and further by black rings, the rest and tarsus bright cinnabar-red. Cercus reddish.

♀. Much larger than male. Antenna not at all thickened.

Length of body ♂ 32, ♀ 47 ; pronotum ♂ 7, ♀ 10·5 ; elytron ♂ 26, ♀ 40 ; hind femur ♂ 20·5, ♀ 27·5 mm.

Madagascar Est, Sambava, Marojejy, Ambinanitelo, 500 m., xii.1958, 1 ♂ (E. Raharizonina).

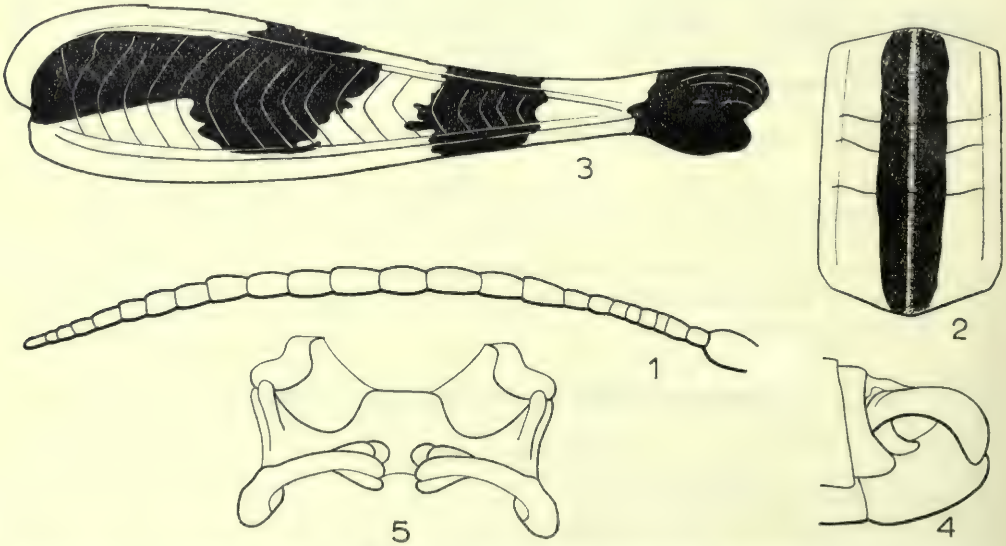

FIG. 25. *Heteracris finoti* I. Bolivar, 1914. 1, male antenna. 2, dorsum of pronotum. 3, hind femur, external side. 4, end of male abdomen, lateral view. 5, epiphallus.
]

Heteracris sikorai (I. Bolivar, 1914),

(Text-fig. 26)

Thisoicetrus sikorai I. Bolivar, 1914 : 25.
Thisoicetrus brevicornis Carl, 1916 : 498, **syn. n.**

The female type of *Th. sikorai* I. Bol. was compared with the original series of males and females of *Th. brevicornis* Carl, and the two species were found identical. One of the males of *Th. brevicornis* is designated here as the specific type.

♂. Antenna slightly shorter than head and pronotum together, slightly thickened in middle part. Fastigium of vertex angular, with obtuse apex, above with wide, obtuse median carinula ; frontal ridge flat, in upper half high, narrowed above antennae. Dorsum of pronotum slightly tectiform ; median carina strong but obtuse ; lateral carinae obtuse, slightly diverging backwards ; metazona shorter than prozona, its posterior margin roundly excurved, almost truncate. Prosternal process cylindrical, with rounded apex. Mesosternal interspace longer than its width. Elytra and wings fully developed, exceeding end of abdomen. Cercus wide, with apical part incurved and strongly downcurved, apex rounded. Lower angle of paraproct narrowed and protruding backwards. General coloration brown. Head brownish ochraceous, with blackish vertical stripe below eyes ; above with brownish longitudinal stripe and brown stripe behind eye. Dorsum of pronotum dirty ochraceous or greenish, with narrow, brown longitudinal stripe with blackish margins, which include narrow, light stripe along median carina. Elytra uniformly brown or with indefinite dark brown spots, dorsal part greenish or ochraceous. Wing bluish, with slightly infumate apex. Hind femur brownish ochraceous, pre-apical part orange-yellowish ; upper part of external side with indefinite longitudinal brownish stripe ; similar, but darker stripe on internal side ; lower side orange-red ; knee blackish. Hind tibia dark bluish or purplish.

♀. As male, but much larger. Antenna filiform, not thickened.

Length of body ♂ 25–26, ♀ 41–48 ; pronotum ♂ 5–5·5, ♀ 8–8·6 ; elytron ♂ 20–22, ♀ 33·5–35 ; hind femur ♂ 15·5–18, ♀ 26·5–29 mm.

Madagascar Centre : réserve naturelle de Zakamena, Nosivola, 1 ♂ ; Manjakandriana, Ambatoloana, xi.1950, 1 ♀ ; Ambositra, mts. Antety, xii.1894, 1 ♀ ; forêt d'Ambohimitombo, i.1895, 1 ♀ ; Ambalavao, Andringitra, cirque Boby, 2,600 m., i.1958, 5 ♂, 4 ♀ (R. Paulian) ; *id.*, plateau Soaindrano, 2,090 m., i.1958, 1 ♀ (R. Paulian) ; *id.*, forêt Vakoana, 1,530 m., i.1958.

Madagascar Est : Perinet, Sahamaloto, i.1949, 1 ♀ (P. Cachan).

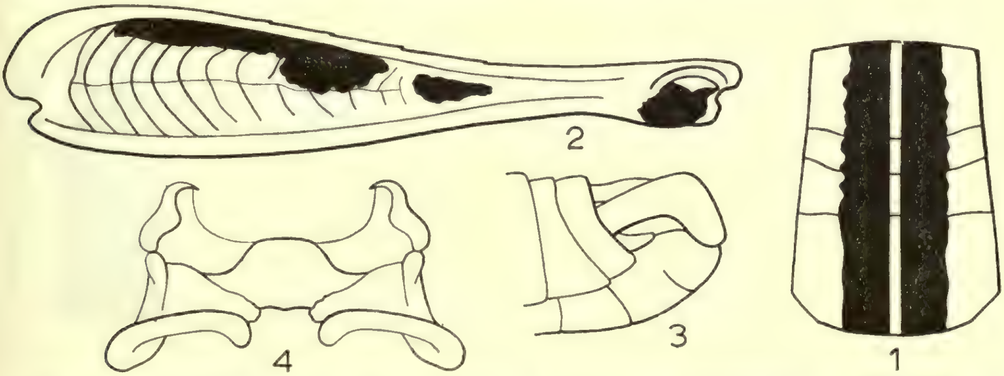

FIG. 26. *Heteracris sikorai* I. Bolivar, 1914. 1, dorsum of pronotum. 2, hind femur, external side. 3, end of male abdomen, lateral view. 4, epiphallus.

Heteracris zolotarevskyi sp. n.

(Text-fig. 27)

♂. Type. Of medium size. Antenna filiform, longer than head and pronotum together. Fastigium of vertex narrowing forwards, with truncate apex; above with low median carinula which is continuous with carinula of vertex and occipital one; frontal ridge comparatively low, flat, slightly narrowed at apex. Dorsum of pronotum slightly tectiform; median carina strong and comparatively sharp; lateral carinae obtuse, diverging backwards; metazona slightly shorter than prozona, its posterior margin obtusangularly excurved. Prosternal process antero-posteriorly compressed, almost transverse, with rounded apex. Mesosternal interspace about as long as its width or slightly longer. Hind femur moderately slender. Elytra and wings fully developed, exceeding end of abdomen. Cercus with strongly incurved and downcurved apical part and obtuse, almost rounded apex. Paraproct large, with lobiform projection on lower end. Subgenital plate short, rounded. General coloration brownish. Head ochraceous-brown, with dark brown stripe below eye, above and behind eye with dark brown longitudinal stripe. Dorsum with wide, widening backwards, longitudinal, brown stripe. Elytra brown with ochraceous spots; wings blue, with infumate apex. Hind femur ochraceous; external side with brownish fasciae, disintegrated into spots; knee dark brown. Base of hind tibia blackish, followed by light whitish ring, and again by brownish ring; rest of tibia and tarsus blue.

♀. Paratype. As male, but larger; no other differences, except sexual.

Length of body ♂ 24·5, ♀ 38·5; pronotum ♂ 5, ♀ 7·6; elytron ♂ 20·5, ♀ 34·5; hind femur ♂ 15·6, ♀ 23·3 mm.

Madagascar Sud: Ejeda, ii.1928, 4 ♂ (including type), 6 ♀ (paratypes). B. N. Zolotarevsky. Type in the British Museum (Natural History).

The new species belongs to the same group as *H. guineensis* Krauss and *H. pulchripes jeanneli* I. Bol. It differs from them by the fastigium of vertex narrowed in apical part, male cercus, pattern and coloration.

The species is named after the eminent locust expert, Dr. B. N. Zolotarevsky, who first collected it.

Heteracris nobilis (Brancsik, 1893), comb. n.

Euprepocnemis nobilis Brancsik, 1893 : 195.

The single female type of the species is lost, but its description and a reasonably good coloured figure suggest that the species is distinct. It differs from *H. finoti* by

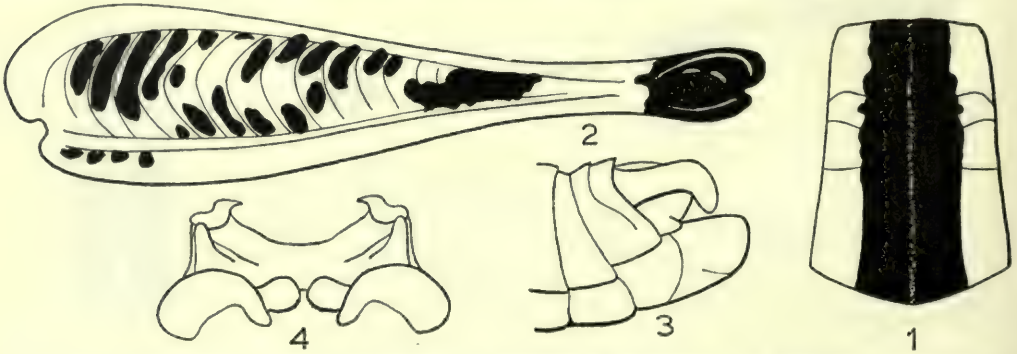

FIG. 27. *Heteracris zolotarevskyi* sp. n. 1, dorsum of pronotum. 2, hind femur, external side. 3, end of male abdomen, lateral view. 4, epiphallus.

the absence of the dark longitudinal stripe on the dorsum of pronotum and by the single transverse stripe on the external side of hind femur.

Length of body 50; pronotum 11; elytron 41; hind femur 28 mm.

Type locality: " Madagascar, Ins Nossibé ".

Heteracris reducta sp. n.

(Text-fig. 28)

♂. Type. Of medium size. Antenna shorter than head and pronotum together, almost filiform, slightly thickened in middle part. Fastigium of vertex angular with obtuse apex; above convex, with slight median carinula, continuous with carinula of vertex; frontal ridge flat, narrowed at apex. Dorsum of pronotum slightly tectiform; median carina strong, obtuse; lateral carinae obtuse, slightly excurved and slightly diverging backwards; metazona shorter than prozona, its posterior margin obtusangularly excurved. Prosternal process subcylindrical, slightly antero-posteriorly compressed with rounded apex. Mesosternal interspace slightly wider than its length. Elytra and wings shortened, reaching base of supra-anal plate. Hind femur comparatively slender. Cercus strongly downcurved and moderately incurved, narrowing to round apex. Paraproct with narrowed and slightly upcurved posterior angle. Subgenital plate short, in profile rounded. General coloration brown. Head brownish ochraceous, with black stripe under eye; above with longitudinal brown stripe and black stripe behind eye. Dorsum of pronotum with dark brown longitudinal stripe, moderately wide, with parallel sides, including light narrow stripe along median carina. Elytra brown without pattern, with greenish dorsal part. Wings blue, with slightly infumate apex. Hind femur dirty ochraceous; on external side, in basal upper part, with indefinite brown longitudinal stripe, and small brown spot in apical half; pre-apical part bright ochraceous; knee blackish; internal side more lightly coloured, with the same pattern as external. Base of hind tibia blackish, followed by yellow ring and afterwards with narrow brownish ring; rest of tibia and tarsus bright red.

♀. Paratype. As male, but larger. Antenna only very slightly thickened in middle part. Hind tibia of variable shade of purple. No other differences, except sexual, from the male.

Length of body ♂ 24, ♀ 38·5; pronotum ♂ 5·4, ♀ 7·3; elytron ♂ 12·5, ♀ 17·3; hind femur ♂ 16·5, ♀ 22 mm.

Madagascar Sud: réserve naturelle XI, mont Andohahelo, 1,800 m. 1 ♂ (type), 4 ♀ (paratypes) (R. Paulian). Type and paratypes in Paris Museum, one paratype in the British Museum (Natural History).

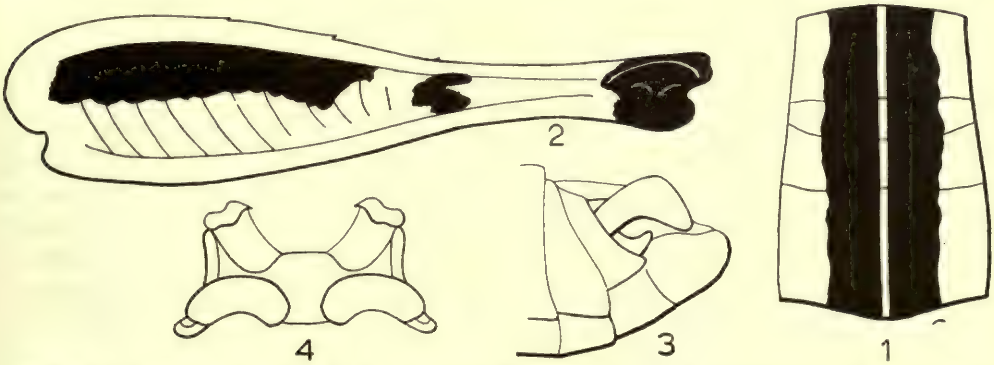

FIG. 28. *Heteracris reducta* sp. n. 1, dorsum of pronotum. 2, hind femur, external side. 3, end of male abdomen, lateral view. 4, epiphallus.

The new species is near to *H. sikorai* but differs by reduced elytra and wings, by shape of male cercus and less developed median carinula of fastigium of vertex.

HORAEOCERUS Saussure, 1899

Of medium size. Integument slightly rugose. Antenna of male from strongly to moderately ensiform, about as long as head and pronotum together ; in female weakly widened in median part. Fastigium of vertex elongate angular, truncate at apex and tectiformly convex, with medium carinula. Frons oblique, frontal ridge in upper half high, with slightly expanded lateral margins, flat, weakly depressed under ocellus. Pronotum slightly tectiform with strong median and moderately strong, slightly diverging backwards, lateral carinae ; metazona shorter than prozona, its posterior margin widely obtusangular. Prosternal process cylindrical, slightly antero-posteriorly compressed, with rounded apex. Elytra fully developed, with semi-transparent membrane and rather sparse reticulation. Hind femur slender. Last abdominal tergite of male with a pair of small acutangular projections. Supra-anal plate in both sexes elongate angular, in male with slightly attenuate apex. Male cercus widened in apical two-thirds, strongly compressed, with downcurved, rounded apex ; in female obtusely conical. Male subgenital plate short, rounded ; in female with slightly angular apex. Phallic complex large, with U-shaped apodeme, very large rami and expanded distal part of ectophallic membrane, which is sclerotized and covering almost completely apical valves of penis and valves of cingulum. Basal valves of penis large, connected with apical ones by thick flexure. Epiphallus with large, curved ancorae and large lobiform lophi. Valves of ovipositor short, robust, with curved apices.

Type species : *Horaeocerus nigricornis* Saussure, 1899.

Horaeocerus nigricornis Saussure, 1899

(Text-fig. 29)

Antenna in male ensiform, in female slightly ensiform. Fastigium of vertex narrow, angular, roundly merging with frontal ridge. General coloration brownish or olive-green ; antenna blackish, with ochraceous apical part ; gena yellow, under eye black vertical stripe ; head above with brownish, wide, longitudinal stripe, which in basal part is continuous with dark brown longitudinal stripe of dorsum of pronotum ; elytron brownish or olive-green, without pattern ; hind wing blue, bluish or infumate, with darkened apex ; hind femur on both sides yellowish, with three black oblique, incomplete, transverse fasciae ; knee brown ; base of hind tibia dark brown, followed by lemon-yellow ring and by wide dark brown ring, the rest pale purplish ; spines whitish, with brown apices.

The species was originally described from male and female. The male is designated here as the type.

A series of specimens shows that the size of body is variable : for male 28–32, for female 40–47 mm. (in original description the male is 21, the female 36 mm.). Wing in original description : " . . . sordidae vitreae, venis fuscis ". In the series studied wing coloration varies from weakly infumate to bluish, and in dark coloured specimens to deep blue. General coloration varies from brown to dark olive-green.

Madagascar Centre : Tananarive, xi.1952, 1 ♂ (E. S. Brown) ; *id.*, Tsimbazaza, 2 ♂, 3 ♀ ; Manjakandriana, Ankadimanga, xii.1957, 1 ♀ (J. Elie) ; Ankazobe, forêt d'Ambohitantely, xii.1954, 2 ♂.

Madagascar Est : Maroantsetra, Ivontaka, 8 m., (P. Soga et E. Raharizonina) ; Tamatave, 27.xii.1947, 1 ♀ ; Perinet, 1 ♂, 1 ♀.

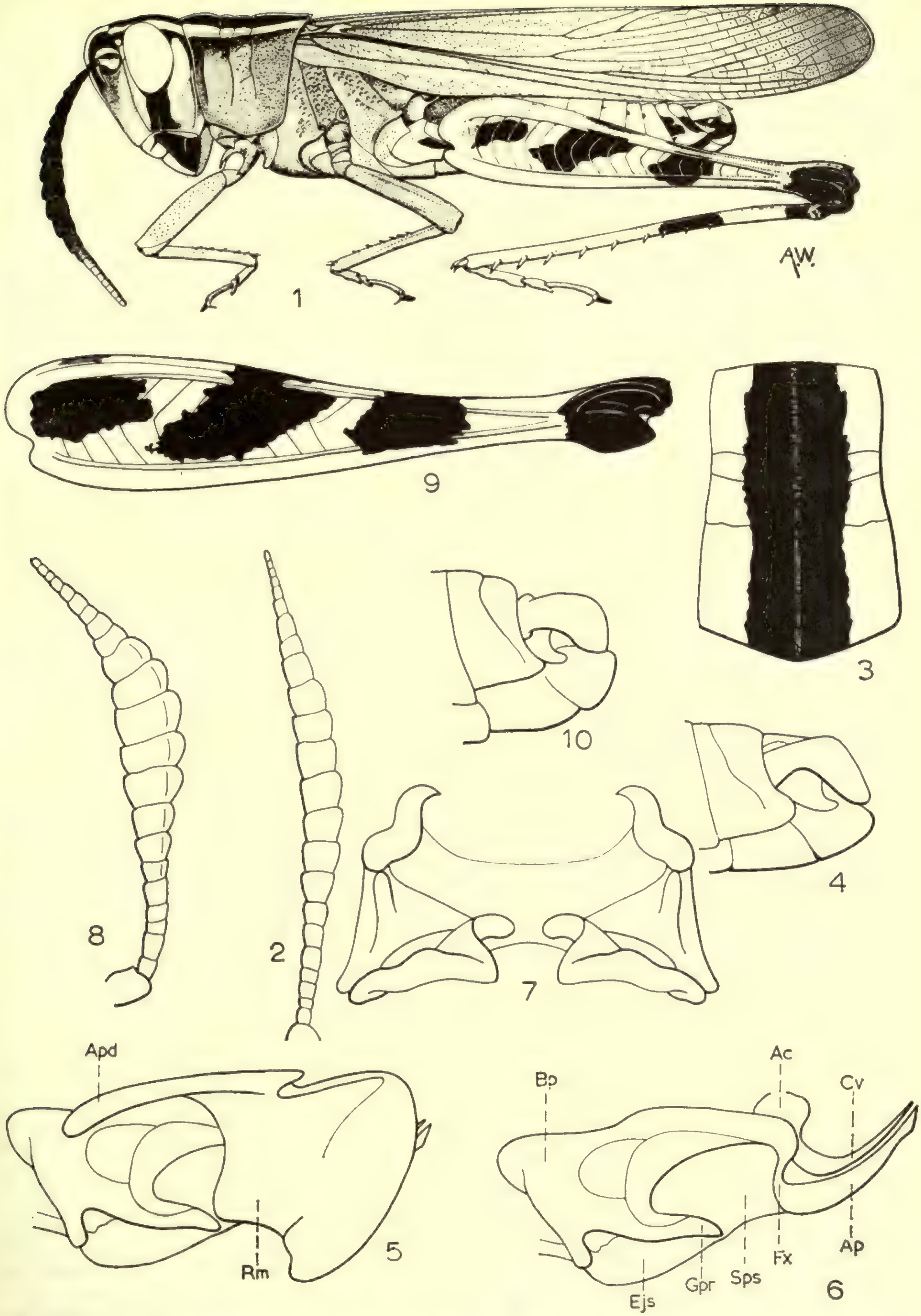
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FIG. 29. 1–7, *Horaeocerus nigricornis* Saussure, 1899. 1, male. 2, male antenna. 3, dorsum of pronotum. 4, end of male abdomen. 5, phallic complex, with ectophallic membrane and epiphallus removed. 6, the same, with most part of cingulum removed. 7, epiphallus. 8–10, *Horaeocerus antennatus* I. Bolivar, 1914, type. 8, male antenna. 9, hind femur, external side. 10, end of male abdomen, lateral view.

Madagascar Ouest : forêt de l'Ankarafantsika, Ampijoroa, 170 m., i.1957, 1 ♀; Antsalova, forêt de l'Antsingy, Andobo, ii.1957, 1 ♂ (P. Griveaud) ; Sakaraha, Lambomakandro, xii.1956, 1 ♀.

Horaeocerus antennatus I. Bolivar, 1914

(Text-fig. 29)

The species was described from the male and the female. I am designating here the male as the type.

The type and the female paratype are discoloured and damaged by previous preservation in spirit. The differences from *H. nigricornis* Sauss. are the shape of male antenna, which in *H. antennatus* is about twice as wide as in *H. nigricornis*, and the cercus which is less curved and wider than in *nigricornis*. The females do not differ at all.

Type locality : " Madagascar ".

Subfamily **CATANTOPINAE**

Key to Genera

1 (4) Fully winged.
2 (3) External apical spine of hind femur present. Tarsus longer than half length of tibia (Text-fig. 30) . . . . ***SEYRIGACRIS*** (p. 327)
3 (2) External apical spine of hind femur absent. Tarsus shorter than half length of tibia . . . . ***CATANTOPS*** (p. 326)
4 (1) Elytra and wings shortened, lobiform or absent.
5 (12) Frons, in profile straight.
6 (9) Elytra lobiform, lateral.
7 (8) Dorsum of pronotum with pair of deep hollows on sides of median carina at posterior transverse sulcus (Text-fig. 32) . . . ***CALDERONIA*** (p. 331)
8 (7) Dorsum of pronotum without hollows (Text-figs. 34, 35) ***SERPUSILLA*** (p. 334)
9 (6) Elytra strongly shortened, but not lateral, touching one another on dorsal side.
10 (11) Male cercus with acute apex (Text-fig. 33) . . . . ***AMBREA*** (p. 331)
11 (10) Male cercus with bifurcate apex (Text-fig. 36) . ***PARASERPUSILLA*** (p. 338)
12 (5) Frons in profile incurved.
13 (16) Elytra shortened or lobiform.
14 (15) Elytra shortened. Frons in profile strongly incurved. Male cerci straight (Text-fig. 37) . . . . ***MANANARA*** (p. 340)
15 (14) Elytra lobiform lateral. Frons in profile slightly incurved. Male cercus incurved (Text-fig. 38) . . . . ***PERINETA*** (p. 342)
16 (13) Wings completely absent (Text-fig. 31) . . ***PSEUDOHYSIELLA*** (p. 328)

CATANTOPS Schaum, 1853

Key to the Madagascar Species

1 (4) Male cercus with apex simple, rounded.
2 (3) Larger and slender. Transverse fasciae on external side of hind femur comparatively short and less oblique . . . . ***sacalava***
3 (2) Smaller and less slender. Transverse fasciae on external side of hind femur comparatively long and more oblique . . . . . . ***stenocrobyloides***
4 (1) Male cercus with apex rounded and slightly excised on lower edge . ***malagassus***

Catantops sacalava Brancsik, 1893

Cantantops sacalava Brancsik, 1893 : 193.
Catantops acuticercus I. Bolivar, 1902 : 626 ; Dirsh & Uvarov, 1953 : 233.

Madagascar Sambirano : Nosy Be, Lokobe, 10.ix.1947, 1 ♀ (R. Paulian) ; Nosy Komba, crête Nord, v.1956, 1 ♂ (A. Robinson) ; Nosy Mitsio, 13, 14.i.1960, 2 ♂ (R. Paulian).

Madagascar Est : Sambava, Marojejy, Ambinanitelo, 500 m., xii.1958, 2 ♂ (E. Raharizonina) ; Ile Sainte Marie, xi.1959, 1 ♂ (E. Razafimandimby) ; Station agricole de Brickaville, 2 ♀ ; Perinet ; Ifanadiana, Ranomafana, 2 ♂, 1 ♀.

Madagascar Centre : Manjakandriana, Ankadimanga, xii.1957, 1 ♂ (J. Elie) ; Ambatofinandrahana, vii.1957, 2 ♂, 1 ♀.

Madagascar Ouest : forêt de l'Ankarafantiska, Ampijoroa, 2 ♀, 1 ♂, *id.*, Bevazaha, 20.i.1950, 1 ♂ ; Antsingy de Bekopaka, vii.1949, 1 ♂ (R. Paulian) ; Morondava, i.1956, 1 ♂ (R. Paulian) ; Sakaraha, Lambomakandro, 4.ii.1958, 1 ♀ (P. Griveaud).

Madagascar Sud : Morombe, lac Iotry, 8.vii–1957, 1 ♂ (P. Griveaud) ; Androy, Tranomaro, ii.1954, 1 ♀ (J. Elie).

Catantops stenocrobyloides Karny, 1907

Madagascar Centre : Manjakandriana, La Mandraka, xii.1952, 1 ♀ (N. L. H. Krauss) ; *id.*, Ankadimanga, xii.1957, 7 ♀, 2 ♂ (J. Elie) ; Ambatolampy, Andramasina, xi.1956, 1 ♀, 2 ♂ (R. Paulian) ; Tsiraonomandidy, mont Ambohiby, 26.v.1948, 2 ♀ (R. Paulian) ; Ambositra, forêt d'Ankazomivady, 1,640 m., 23.vii. 1957, 6 ♂, 6 ♀ (P. Griveaud) ; Tananarive, Tsimbazaza, 17.iv.1948, 1 ♂ (R. Paulian).

Madagascar Est : Ile Sainte Marie, Ambatoroa, v.1959, 1 ♂ (E. Razafimandimby).

Catantops malagassus Karny, 1907

Madagascar Centre : Manjakandriana, Ankadimanga, xii.1957, 2 ♂ (J. Elie).

Madagascar Est : Tamatave, vii.1958, 4 ♀, 1 ♂ (J. Elie) ; Ile Sainte Marie, Ambohidena, v.1959, 1 ♀ ; *id.*, Ambatoroa, v.1959, 1 ♀ (E. Razafimandimby).

Madagascar Ouest : Morondava, forêt Sud de Befasy, i.1956, 1 ♀ (R. Paulian).

Iles Glorieuses, 5.iv.1948, 1 ♀ (P. Cachan).

SEYRIGACRIS C. Bolivar, 1932

Of medium size. Integument finely rugose. Antenna filiform, longer than head and pronotum together. Head conical ; fastigium of vertex angular, with slight longitudinal depression ; interocular distance narrower than basal antennal segment ; frons strongly oblique, straight ; frontal ridge wide, with well developed, parallel lateral carinulae. Pronotum cylindrical ; dorsum crossed by three sulci ; metazona much shorter than prozona, its posterior margin widely obtusangular, almost rounded ; carinae absent. Prosternal process obtusely conical. Mesosternal interspace slightly wider than its length, with incurved sides. Elytra and wings reaching end of abdomen. Elytron parchment-like with reduced venation and reticulation ; without stridulatory specialization. Hind wing widened, with strongly excurved external margin ; tympanum present. Hind femur moderately slender. External apical spine of hind tibia present. Hind tarsus more than half length of hind tibia. Arolium large. Last abdominal tergite of male with a pair of large, rounded projections. Supra-anal plate elongate-angular. Cercus long, subconical, slightly incurved, with obtuse apex. Subgenital plate short, with rounded apex.

Only male known.

Type species : *Seyrigacris nigrofasciatus* C. Bolivar, 1932.

Seyrigacris nigrofasciatus C. Bolivar, 1932

(Text-fig. 30)

♂. Type. General coloration blackish, with yellowish stripes and spots. Antenna black with yellowish rings. Face yellowish with black transverse stripe above clypeus and round yellowish spot in middle of it. Head and pronotum above with four continuous black stripes and yellowish background. Anterior part of elytron, up to radial vein, blackish, rest brownish. Hind wing infumate. Hind femur on external side brownish, with a pair of yellowish spots. Hind knee black, with lower lobe yellowish. Hind tibia and spines black. Tarsus black with yellowish spot on metatarsus and arolium.

Length of body 24 ; pronotum 5·3 ; elytron 17 ; hind femur 13 mm.

Only male type, from Rogez, is known. Preserved in Madrid Museum.

***PSEUDOHYSIELLA* gen. n.**

Small. Body narrow-cylindrical. Integument rugose. Antenna rod-like, shorter than head and pronotum together. Head conical ; fastigium of vertex angular, separated from vertex by depression ; interocular distance as wide as basal antennal segment ; frons strongly oblique and incurved ; frontal ridge protruding above ocellus, slightly concave in middle, with weak lateral carinulae. Pronotum cylindrical ; carinae absent ; three sulci crossing dorsum, first being incomplete ; metazona about one-third length of prozona, its posterior margin straight. Prosternal process short, widening towards rounded apex. Mesosternal interspace strongly constricted in middle. Elytra, wings and tympanum absent. Hind femur slender, not reaching end of abdomen. External apical spine of hind tibia absent. Tarsus slightly elongated. Arolium large. Last abdominal tergite of male with pair of acutangular projections. Supra-anal plate angular, with strong transverse furrow and acutely attenuate apex. Cercus narrow conical, straight, slightly upcurved at apex. Subgenital plate acutely conical. Phallic organ robust. Basal and apical valves of penis connected by thick, strong flexure. Apical valves of penis and valves of cingulum not covered by sheath. Arch of cingulum large, valves of cingulum short. Epiphallus bridge-shaped, with short angular, incurved ancorae and small lobiform lophi.

Type species : *Hysia inermis* Karsch, 1896.

The new genus superficially resembles *Hysiella*, but differs from it as follows :

Pseudohysiella	*Hysiella*
Frons incurved ; upper part of frontal ridge strongly protruding	Frons straight ; upper part of frontal ridge not protruding.
Antenna rod-like, shorter than head and pronotum together	Antenna filiform, much longer than head and pronotum together.
Three sulci crossing dorsum of pronotum	Four sulci crossing dorsum of pronotum.
Mesosternal interspace strongly constricted in middle	Mesosternal interspace not constricted, with regularly incurved sides.
Male subgenital plate acutely conical	Male subgenital plate obtusely conical.
External apical spine of hind tibia absent	External apical spine of hind tibia present.

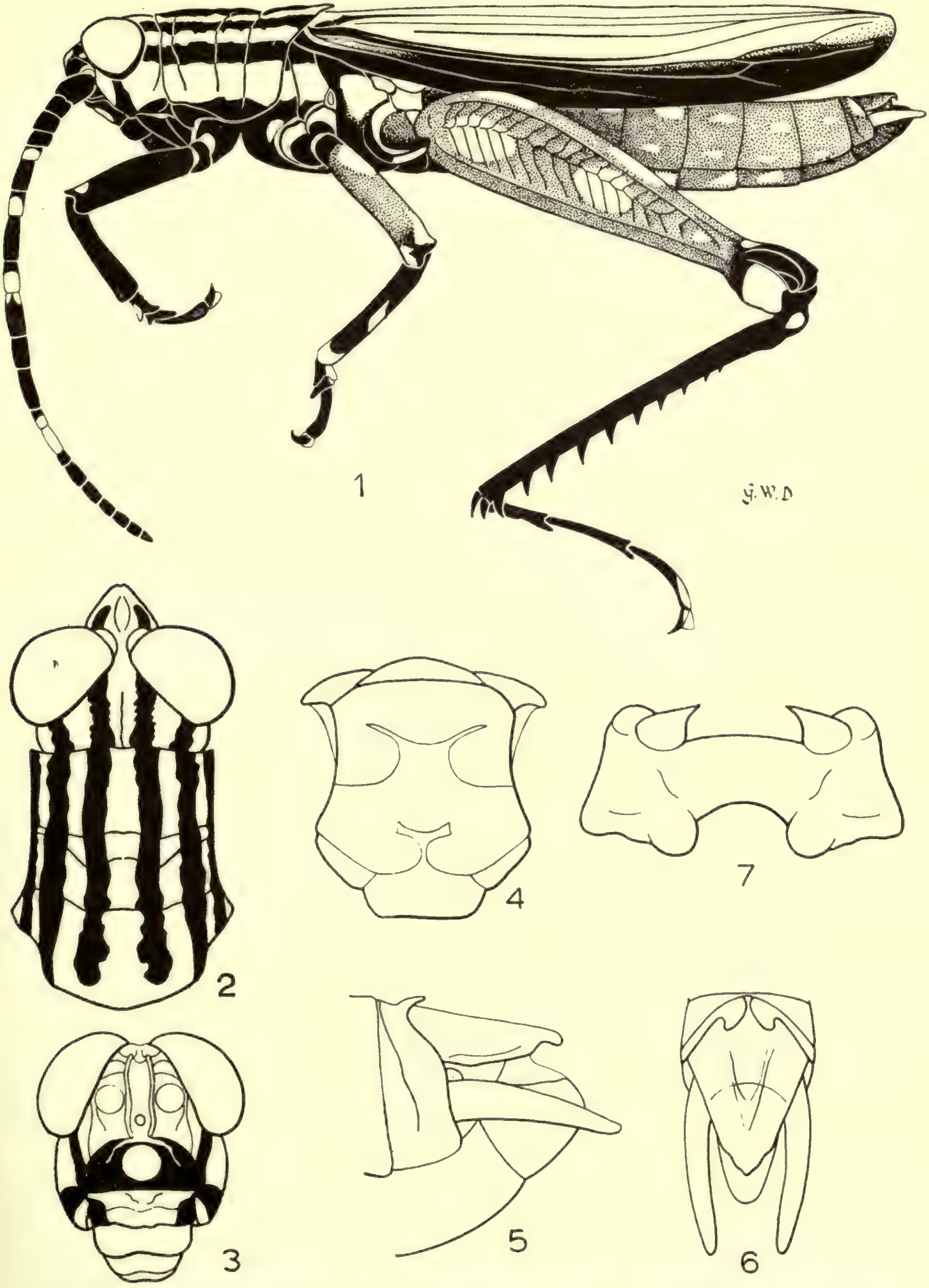

FIG. 30. *Seyrigacris nigrofasciatus* C. Bolivar, 1932, type. 1, male. 2, head and pronotum, from above. 3, face. 4, sternum. 5, end of male abdomen, lateral view. 6, the same, from above. 7, epiphallus.

Pseudohysiella inermis (Karsch, 1896), **comb. n.**

(Text-fig. 31)

Hysia inermis Karsch, 1896 : 278.
Hysiella inermis I. Bolivar, 1906 : 395.

General coloration brownish ochraceous. Sides and lower surface of body reddish. Head yellowish, with blackish, irregular spots. Behind eyes and on lateral lobe of pronotum, indefinite blackish stripe ; lower margin of lateral lobes yellowish. External side of hind femur ochraceous with blackish longitudinal stripe on upper part, interrupted by ochraceous fish-bone pattern ; internal and lower internal side bright red ; lower external side blackish ; hind tibia above light olive-greenish above, blackish brown below ; tarsus light olive-greenish.

Female unknown.

Length of body ♂ 15·2 ; pronotum 2·3 ; hind femur 8 mm.

Madagascar Centre : Route de Tamatave, km. 22, 10.x.1948, 1 ♂, (P. Cachan). The type (in Berlin Museum) was described from " Madagascar Australis ".

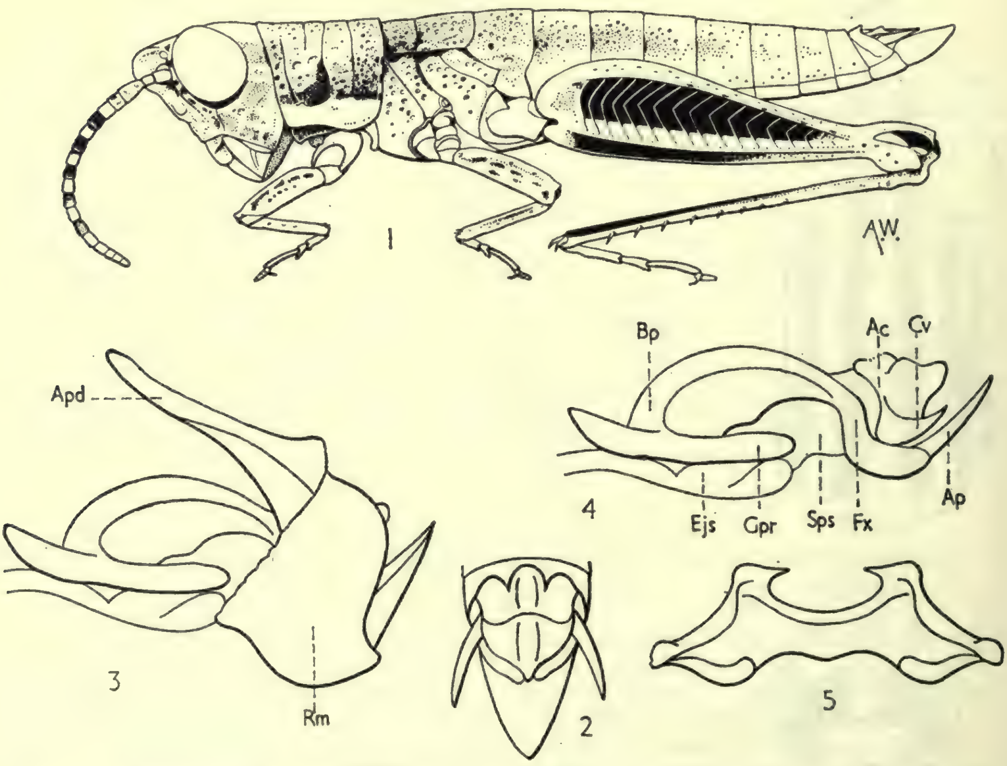

FIG. 31. *Pseudohysiella inermis* (Karsch, 1896). 1, male. 2, end of male abdomen from above. 3, phallic complex, with ectophallic membrane and epiphallus removed. 4, the same, with most part of cingulum removed. 5, epiphallus.

CALDERONIA I. Bolivar, 1908

Of medium size ; body robust, fusiform. Integument rugose. Antenna filiform, longer than head and pronotum together. Fastigium of vertex in male with angular base and protruding, square apical part and excised apex, in female wide trapezoidal, with almost truncate apex ; in male with longitudinal concavity, in female flat, sloping ; interocular distance in male as wide as basal antennal segment, in female slightly wider ; frons slightly oblique ; frontal ridge between antennae roundly protruding forwards, in male with deep sulcus ; almost obliterated below ocellus. Pronotum subcylindrical, slightly constricted in prozona ; dorsum slightly inflated, crossed by two sulci ; median carina linear, lateral carinae absent, or discernible in frontal part of prozona ; on sides of median carina at posterior sulcus there is pair of very deep, oval cavities ; metazona about half length of prozona, its posterior margin straight ; lateral lobes of pronotum concave. Prosternal process conical, with wide base and acute apex. Mesosternal interspace wider than its length. Elytra lobiform, lateral, covering large tympanum, widening towards apex, excised in upper apical part. Hind femur moderately slender. External apical spine of hind tibia absent. Arolium moderately large. Last abdominal tergite of male with a pair of long projections. Supra-anal plate elongate-angular, with slightly attenuate, angular apex. Cercus short, incurved, with obtuse apex. Subgenital plate short subconical, with obtuse apex. Phallic complex robust. Sheath of penis absent ; rami large ; basal and apical valves of penis connected by long, moderately thin flexure ; apical valves of penis short, robust ; valves of cingulum robust ; arch of cingulum large. Epiphallus bridge-shaped with large angular ancorae and large, upcurved, wide, lobiform lophi. Female subgenital plate with shallowly bilobate apex. Ovipositor short, robust, with valves curved at apices.

Type species : *Calderonia biplagiata* I. Bolivar, 1908.

This genus probably belongs to the group Serpusiae, which is well represented in Madagascar, but the phallic complex deviates greatly from any found in the group.

Calderonia biplagiata I. Bolivar, 1908

(Text-fig. 32)

♂. Antenna twenty-three-segmented. Integument of dorsum of pronotum strongly rugose and granulose. Lower margin of lateral lobe of pronotum excurved. Elytra with rough net of venation, main veins traceable only in base. General coloration brown. First and second basal segments of antenna blackish below. Gena and lower part of lateral lobes of pronotum dirty ochraceous, upper part of lateral lobe with curved dark brown stripe ; cavities on dorsum of pronotum black. External side of hind femur brown, with ochraceous short stripe on basal upper part ; internal side black. Hind tibia brownish.

♀. As male, but larger. Pattern and coloration as in male.

Length of body ♂ 15·3, ♀ 29 ; pronotum ♂ 5, ♀ 8 ; elytron ♂ 3, ♀ 4 ; hind femur ♂ 12, ♀ 16 mm.

The female type was studied. The male is described here for the first time.

Madagascar Sambirano : Nosy-Komba, Flanc Nord, v.1956, 1 ♂, 2 ♀ (A. R.). Type locality Diego-Suarez.

AMBREA **gen. n.**

Small. Integument moderately rugose. Antenna filiform, slightly widening towards apical part, shorter than head and pronotum together. Fastigium of vertex narrow, angular, with slightly truncate apex ; sides with marginal carinulae and longitudinal concavity between them ; interocular distance about as wide as basal antennal segment ; vertex-occipital carinula present. Frons oblique, almost straight, frontal ridge narrow, slightly roundly protruding between antennae ; flat, slightly constricted at ocellus ; with lateral carinulae almost obliterated.

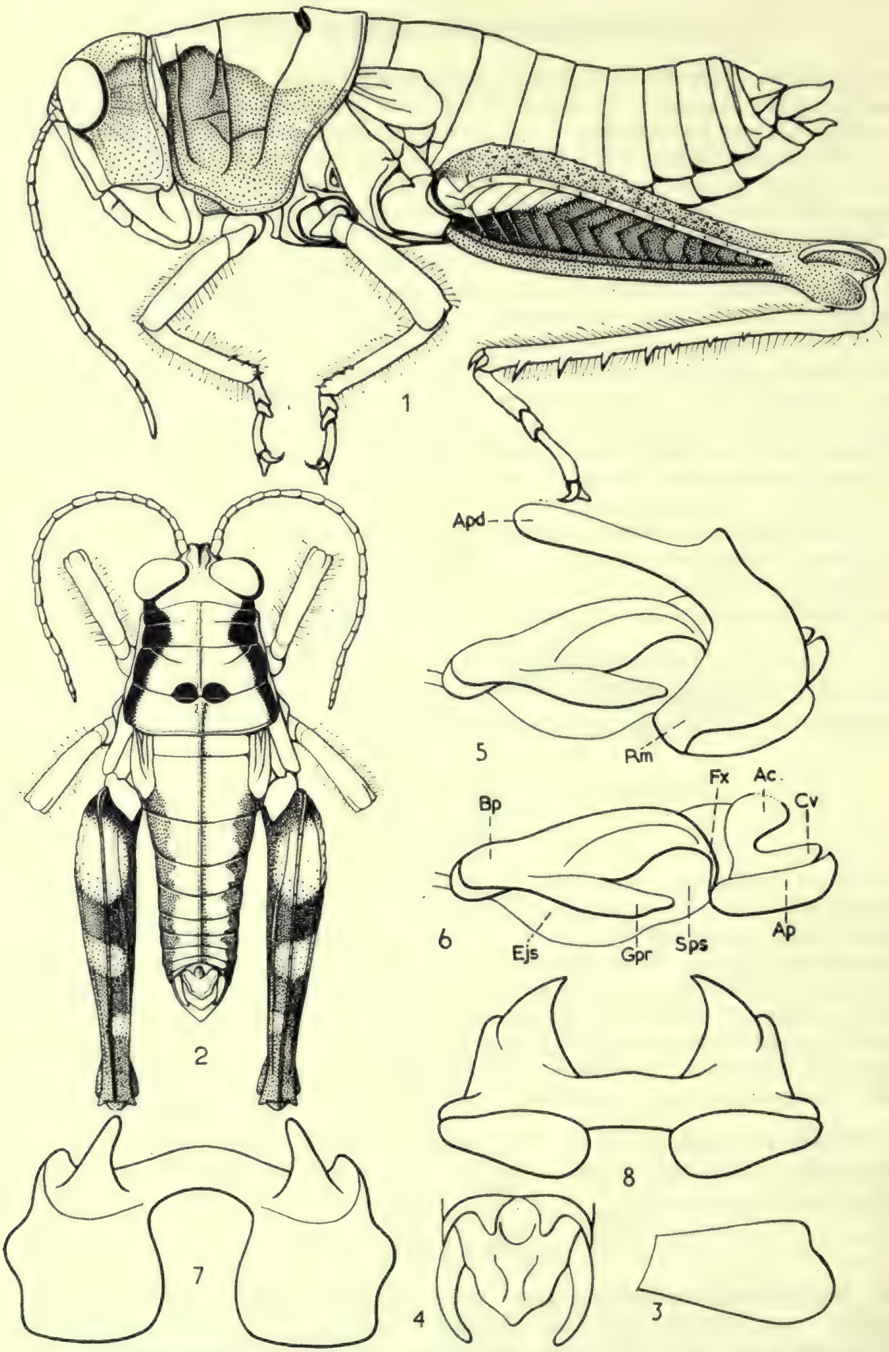
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FIG. 32. *Calderonia biplagiata* I. Bolivar, 1908. 1, female. 2, male. 3, left elytron. 4, end of male abdomen, from above. 5, phallic complex, with ectophallic membrane and epiphallus removed. 6, the same, with most part of cingulum removed. 7. epiphallus, lophi in horizontal position. 8, the same, lophi in vertical position.

Eyes and ocelli of moderate size. Pronotum subcylindrical, with weakly tectiform dorsum, with linear median but no lateral carinae, and three narrow sulci ; metazona much shorter than prozona, its posterior margin obtusangular. Prosternal process transverse, spathulate, with excised apex. Mesosternal interspace in male as long as its width, in female slightly wider. Elytra strongly shortened reaching end of second abdominal tergite and touching one another on dorsal side ; precostal area expanded, apex rounded ; venation and reticulation dense. Hind femur moderately slender, slightly exceeding end of abdomen ; lower lobes of hind knee rounded. Arolium large. Last abdominal tergite of male with pair of moderate-sized projections. Supra-anal plate elongate angular, with slightly attenuate apex and upcurved sides ; in middle with shallow longitudinal sulcus. Cercus slender, incurved, strongly narrowed in apical part and with acute apex. Subgenital plate short, obtusely conical. Phallic complex relatively large, with large apodemes and rami. Sheath of penis absent. Basal and apical valves of penis connected by thick flexure ; apical valves very large, robust, lobiform. Arch of cingulum large ; valves of cingulum small, reduced. Gonopore process long. Epiphallus bridge-shaped, with small angular ancorae and large, upcurved, lobiform lophi. Female subgenital plate with angular apex. Valves of ovipositor moderately short and slender, with slightly curved apices.

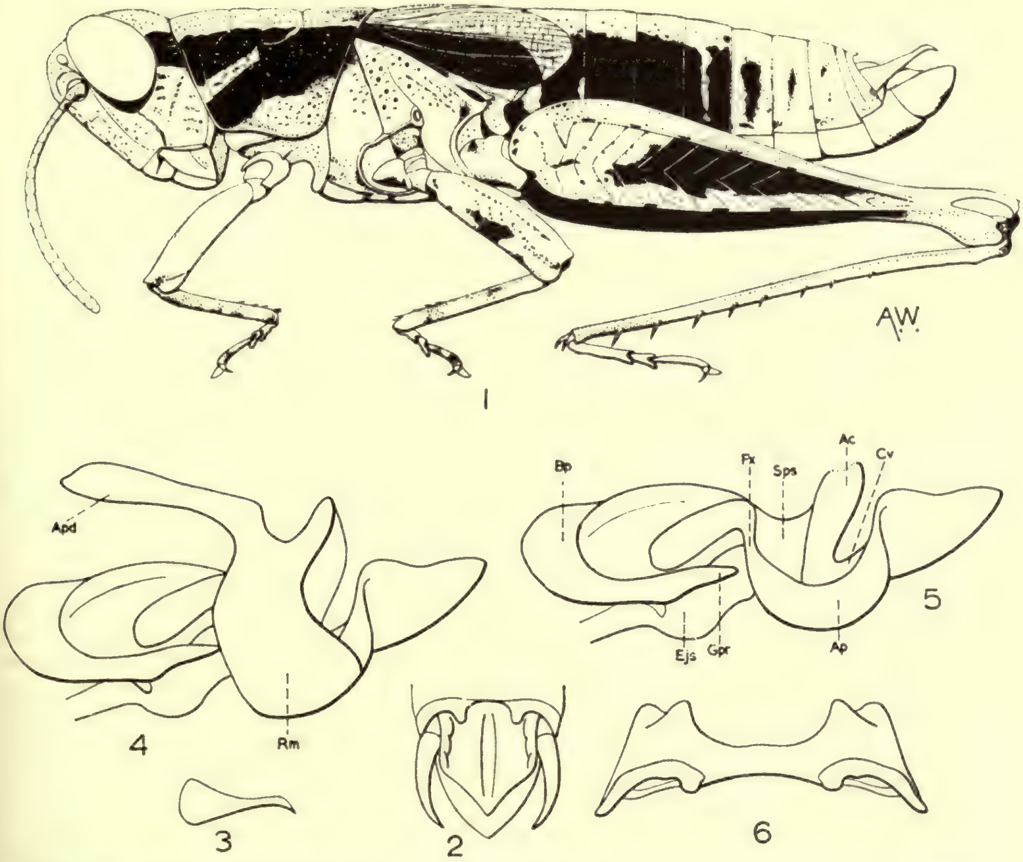

FIG. 33. *Ambrea acuticerca* sp. n. 1, male, type. 2, end of male abdomen. 3, male left cercus. 4, phallic complex, with ectophallic membrane and epiphallus removed. 5, the same, with most part of cingulum removed. 6, epiphallus.

Type species : *Ambrea acuticerca* sp. n.

This new genus, resembles *Paraserpusilla* in general appearance. It differs in the structure of the male cercus, which in *Ambrea* is acute and in *Paraserpusilla* bifurcate ; in the elytra, which in *Paraserpusilla* reach the third abdominal tergite and touch one another at the dorsum, but in *Ambrea* are lobiform. The two genera differ particularly in the structure of the phallic complex, especially in the shape of the apical valves of the penis and epiphallus (see Text-figs. 33, 36).

Ambrea acuticerca sp. n.

(Text-fig. 33)

♂. Type. Antenna twenty-segmented. Dorsum of pronotum moderately rugose ; lateral lobes of pronotum slightly concave. General coloration brownish. Lateral lobe of pronotum with brown, shiny, curved stripe, and diffusing ochraceous spot on lower margin and smaller stripe-like spot in upper anterior part ; pleura ochraceous ; elytron brown, with basal two-thirds of precostal area blackish. Hind femur brown, internal side dark brown ; hind tibia brownish.

♀. Paratype. As male, but larger. Coloration as in male, but duller and without blackish spot on elytron.

Length of body ♂ 15·5, ♀ 21·6 ; pronotum ♂ 4, ♀ 5 ; elytron ♂ 4·2, ♀ 5 ; hind femur ♂ 9·6, ♀ 12 mm.

Madagascar Nord : Montagne d'Ambre, Les Roussettes 1,100 m., xi–xii.1958, 4 ♂ (including type) 6 ♀ (A. Robinson). Type and paratypes in Paris Museum. One male, one female paratype in the British Museum (Natural History).

SERPUSILLA Ramme, 1931

Small. Integument rugose. Antenna filiform, longer or shorter than head and pronotum together. Fastigium of vertex sloping forwards, angular, with obtuse, slightly excised apex and longitudinal depression in middle ; interocular distance slightly wider than basal antennal segment ; frons oblique, almost straight, with slightly protruding upper part ; frontal ridge narrow, with shallow sulcus and obtuse lateral carinulae, gradually diverging downwards ; vertex and occiput with strong median carinula. Pronotum strongly or slightly rugose, dorsum subcylindrical or slightly tectiform, crossed by three deep sulci, median carina weak, lateral carinae replaced by callosities ; metazona about one-third of length of prozona, its posterior margin incurved. Prosternal process thick-spathulate, with slightly bilobate apex. Mesosternal interspace slightly longer than its width. Elytra narrow, lobiform, lateral, slightly exceeding first abdominal tergite and covering tympanum. Hind femur slender. External apical spine of hind tibia absent. Arolium large. Last abdominal tergite of male with a pair of small, rounded projections. Supra-anal plate elongate-angular. Cercus narrow, acutely conical, straight. Subgenital plate short, conical. Phallic organ robust, with comparatively short apodemes and large rami. Basal and apical valves of penis connected by thick flexure. Valves of cingulum and apical valves of penis large, not covered by sheath. Arch of cingulum large. Epiphallus bridge-shaped, with small, angular ancorae and lobiform lophi. Valves of ovipositor slender, with curved apices.

Type species : *Bibracte* (?) *malagassa* Bruner, 1910.

This genus is related to *Auloserpusia* Rehn, 1914, but differs in the shape of the spathulate prosternal process, which in *Auloserpusia* is acutely conical, in the less rugose pronotum and in the longer elytra.

KEY TO SPECIES

1 (4) Integument, especially pronotum, strongly rugose; median carina almost obliterated.

2 (3) Pronotum subcylindrical, with comparatively weak lateral callosities. End of male abdomen bright red . . . . ***erythropyga*** Chopard

3 (2) Pronotum subcylindrical, but with slightly flattened dorsum and strong lateral callosities. End of male abdomen dirty ochraceous . . ***ochreopyga*** sp. n.

4 (1) Integument moderately rugose; dorsum of pronotum moderately or slightly rugose, lateral lobes shiny; median carina distinct.

5 (6) Fastigium of vertex with deep concavity above. Dorsum of pronotum moderately rugose. Hind tibia with reddish tinge . . . ***malagassa*** Bruner

6 (5) Fastigium of vertex only with trace of shallow concavity above. Dorsum of pronotum slightly rugose. Hind tibia brownish with slight greenish tinge ***glabra*** sp. n.

Serpusilla malagassa (Bruner, 1910)

(Text-fig. 34)

Bibracte (?) *malagassa* Bruner, 1910 : 640.
Serpusilla malagassa (Bruner, 1910) Ramme, 1931 : 938.

♂. Integument moderately rugose. Fastigium of vertex comparatively wide with deep concavity. Pronotum slightly tectiform, with median carina comparatively well developed. General coloration brownish. Frons and genae ochraceous; first and second basal antennal segments with dark brown spots. On lateral lobe of pronotum a dark brown longitudinal, crescentic curved stripe. Anterior half of elytron shiny, dark brown. Hind femur testaceous, with brownish longitudinal stripe on both sides, that on external side on lower half and not reaching base of femur; lower side of femur and tibia with reddish tinge.

♀. As the male, but larger. Subgenital plate with angular apex. Valves of ovipositor narrow, slender, with curved apices. Brownish stripe on sides of hind femur sometimes disintegrating into several spots.

Length of body ♂ 12·5–13·5, ♀ 17–20; pronotum ♂ 3–3·5, ♀ 4–4·5; elytron ♂ 2–2·4, ♀ 2·5–3; hind femur ♂ 7·5–9, ♀ 11·5–12 mm.

The original material on which Bruner based his description was studied. Here the male is designated as the type.

Type locality : " Fianarantsoa, Madagascar ".

Madagascar Est : Perinet, iv.1951, 3 ♂, 5 ♀ (A. R.).

Madagascar Centre : Tananarive, ii–iii.1950, 32 ♂, 19 ♀.

Serpusilla glabra **sp. n.**

(Text-fig. 34)

♂. Type. Integument slightly rugose. Fastigium of vertex narrow, with trace of shallow concavity. Pronotum slightly tectiform, with median carina distinct, dorsum only slightly rugose.

General coloration brownish. First and second basal antennal segments with brown spots. Frons, clypeus and genae dirty ochraceous. Lateral lobe of pronotum with dark brown longitudinal crescent-shaped stripe. Costal area of elytron with shiny dark brown longitudinal spot. External side of hind femur dirty ochraceous; on lower part, along lower carinula, a dark brown longitudinal stripe with irregular edges, continuous with small basal spot of the same colour; lower and internal side of hind femur brown; hind tibia brownish, with olive-green tinge.

♀. Paratype. As the male, but larger. Apex of subgenital plate obtusangular, almost truncate. Ovipositor short, with moderately slender valves, curved at apices.

Length of body ♂ 12–15, ♀ 19·5–22; pronotum ♂ 3·2–3·8, ♀ 5·2–5·3; elytron ♂ 2·2–3·6, ♀ 3·6–4; hind femur ♂ 7–9·2, ♀ 12·8–13 mm.

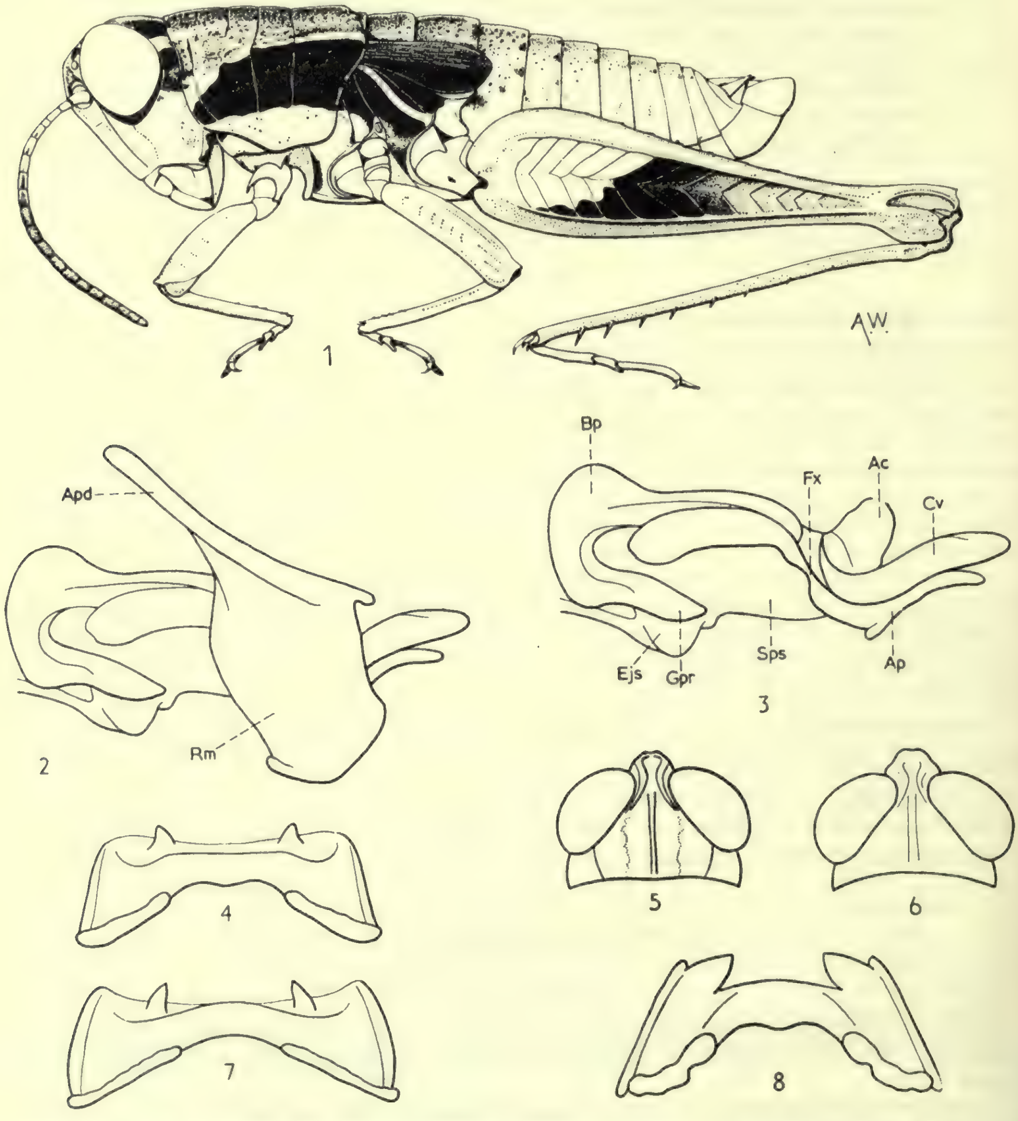

FIG. 34. 1–5, *Serpusilla malagassa* (Bruner, 1910). 1, male. 2, phallic complex, with ectophallic membrane and epiphallus removed. 3, the same, with most part of cingulum removed. 4, epiphallus. 5, head, from above. 6–7, *Serpusilla glabra* sp. n. 6, head, from above. 7, epiphallus. 8, *Serpusilla ochreopyga* sp. n., epiphallus.

Madagascar Centre : Manjakandriana, Ambatoloana, vi.1957, 1 ♂ (A. Robinson) ; *id.*, La Mandraka, iv.1950, 1 ♂ (A. Robinson).

Madagascar Ouest ; forêt de l'Ankarafantsika, Ampijoroa, 1 ♀ ; Morafenobe, forêt Mahajeby, v.1952, 1 ♂ (type), 4 ♀ (R. Paulian).

Type in Paris Museum. One ♂ and one ♀ paratype in the British Museum (Natural History).

Serpusilla ochreopyga sp. n.

(Text-fig. 34)

♂. Type. Body slightly fusiform. Integument strongly rugose. Fastigium of vertex narrow, angular, with narrow concavity. Pronotum with slightly flattened dorsum and strong lateral callosities. General coloration blackish brown. Antenna brownish with lighter apical

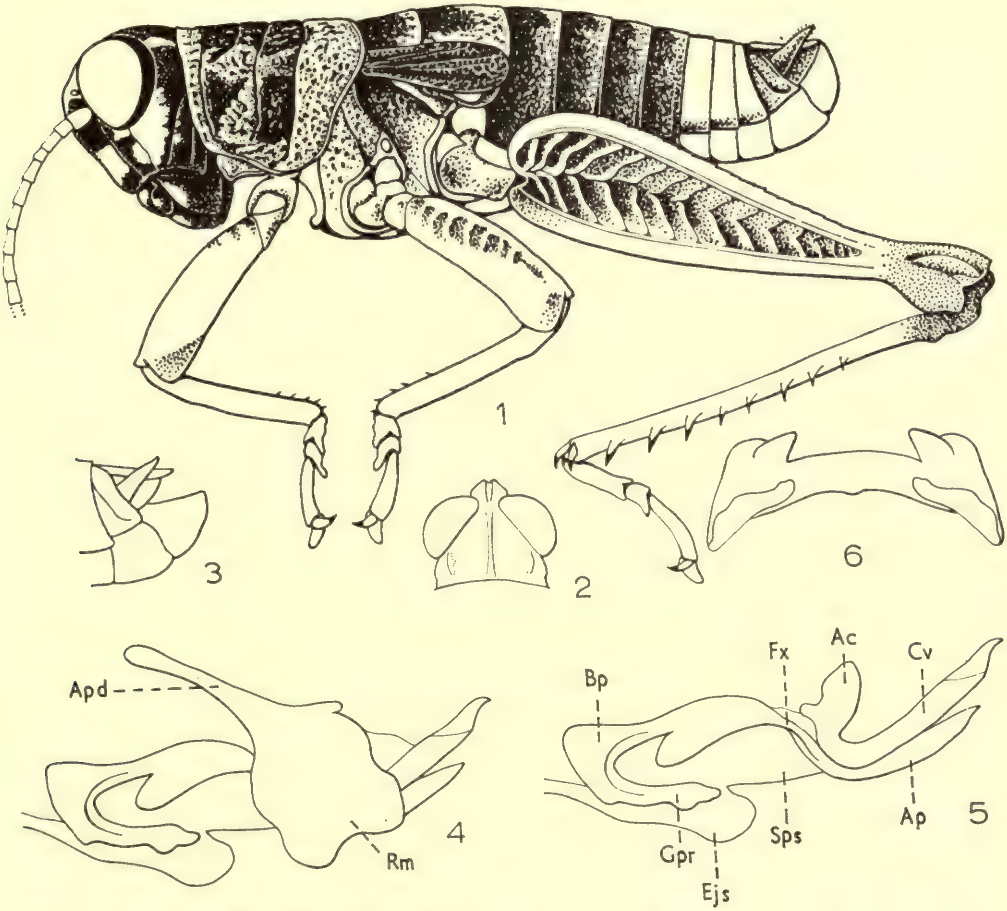

FIG. 35. *Serpusilla erythropyga* Chopard, 1952. 1, male, type. 2, head, from above. 3, end of abdomen, lateral view. 4, phallic complex, with ectophallic membrane and epiphallus removed. 5, the same, with most part of cingulum removed. 6, epiphallus.

part. Fastigium of vertex, frons, clypeus and genae yellow ; frontal ridge, at ocellus, with blackish transverse fascia, which is continuous with large blackish spots at bases of antennae. Pronotum blackish, with yellow spot in upper anterior part of lateral lobe ; abdomen brownish, with not very distinct yellowish spots ; end of abdomen from sixth segment dirty ochraceous ; pleura, in corner between elytron and pronotum, with bright red spot ; elytron black. Anterior and middle legs light green. External side of hind femur black, in upper basal half with bright red longitudinal stripe, interrupted in posterior part by black spot ; external side of upper femoral carina with narrow yellow stripe ; internal side as external, but with less developed red pattern. Hind tibia dark green.

♀. Paratype. As male, but larger. Apex of subgenital plate slightly angular. Valves of ovipositor slender, with slightly curved apcies. General coloration uniformly brownish, without pattern. External side of hind femur brown, ochraceous in basal upper part ; lower and base of internal side dark red ; hind knee dark red ; hind tibia red.

Length of body ♂ 14·5–15, ♀ 22–22·5 ; pronotum ♂ 4, ♀ 5–5·2 ; elytron ♂ 3, ♀ 4 ; hind femur ♂ 11, ♀ 14·6–15 mm.

Madagascar Est : Andapa, mont Anjanaharibe, 1,600 m., iv.1960, 4 ♂ (including type), 5 ♀ (P. Soga) ; Sambava, Marojejy, 1,140 m., xi.1959, 3 ♂ (P. Soga). Type in Paris Museum. One ♂ and one ♀ paratype in the British Museum (Natural History).

Serpusilla erythropyga Chopard, 1952

(Text-fig. 35)

Redescription of ♂ type. Body cylindrical. Integument strongly rugose and sparsely hairy. Fastigium of vertex widely obtusangular. Pronotum subcylindrical, with median carina obliterated, lateral carinae represented by moderately developed callosities. General coloration blackish brown, with yellowish and red spots. Fastigium of vertex above cheek, below eye, frons below ocellus, clypeus and labrum, with large ochraceous spots. Pronotum rust-brownish, with brown-blackish spot on dorsum and lateral lobes. All femora yellowish brown ; tibiae and tarsi green ; hind knee red. Five basal abdominal tergites dark blackish brown with yellowish brown transverse stripes. End of abdomen bright cinnabar-red.

Length of body ♂ 15·5, ♀ 24 ; pronotum ♂ 3·7, ♀ 3·8 ; elytra ♂ 3, ♀ 4 ; hind femur ♂ 10, ♀ 13·8 mm.

Madagascar Sambirano : Mont Tsaratanana, forêt de mousses, 1,500 m., 1 ♂, type, in Paris Museum.

PARASERPUSILLA gen. n.

Of medium size. Integument moderately rugose. Antenna filiform, slightly thickened at apex, shorter than head and pronotum together. Fastigium of vertex narrow, angular, with incurved sides, slight marginal carinulae extending to vertex, and with sulcus-like concavity ; interocular distance narrower than basal antennal segment ; vertex-occipital carinula present. Frons oblique ; frontal ridge narrow, slightly roundly protruding between antennae ; at ocellus slightly constricted, below it shallowly concave. Eyes and ocelli large. Pronotum subcylindrical with sharp, linear median but no lateral carinae ; three narrow sulci crossing dorsum, metazona much shorter than prozona, its posterior margin angular. Prosternal process transverse, thick, spathulate, with straight or slightly incurved apical margin. Mesosternal interspace about as long as wide or, in female, wider than its length. Elytra and wings shortened, reaching third abdominal tergite and touching one another at dorsum ; precostal area slightly expanded ; apex rounded ; venation and reticulation dense. Wing shorter than elytron. Hind femur moderately robust, reaching or slightly exceeding end of abdomen ; lower lobes of hind knee widely rounded. Arolium large. Last abdominal tergite of male with pair of long acutangular projections. Supra-anal plate elongate-angular, with upturned sides and narrow median, longitudinal sulcus. Cercus incurved, with deeply bifurcate apex. Subgenital plate short, subconical. Phallic complex robust. Apodemes large, elongate, rami very large, with expanded upper part. Sheath of penis absent ; flexure between basal and apical valves of penis rather thick ; arch of cingulum robust ; gonopore process long. Epiphallus bridge-shaped ; ancorae small, angular ; lophi large, lobiform. Female subgenital plate with angular apex. Ovipositor short, with valves slightly curved at apices.

Type species : *Paraserpusilla furcata* sp. n.

This new genus differs from *Serpusilla* Ramme, 1931 in the elytra, which touch one another on the dorsal side, in the angular posterior margin of the pronotum,

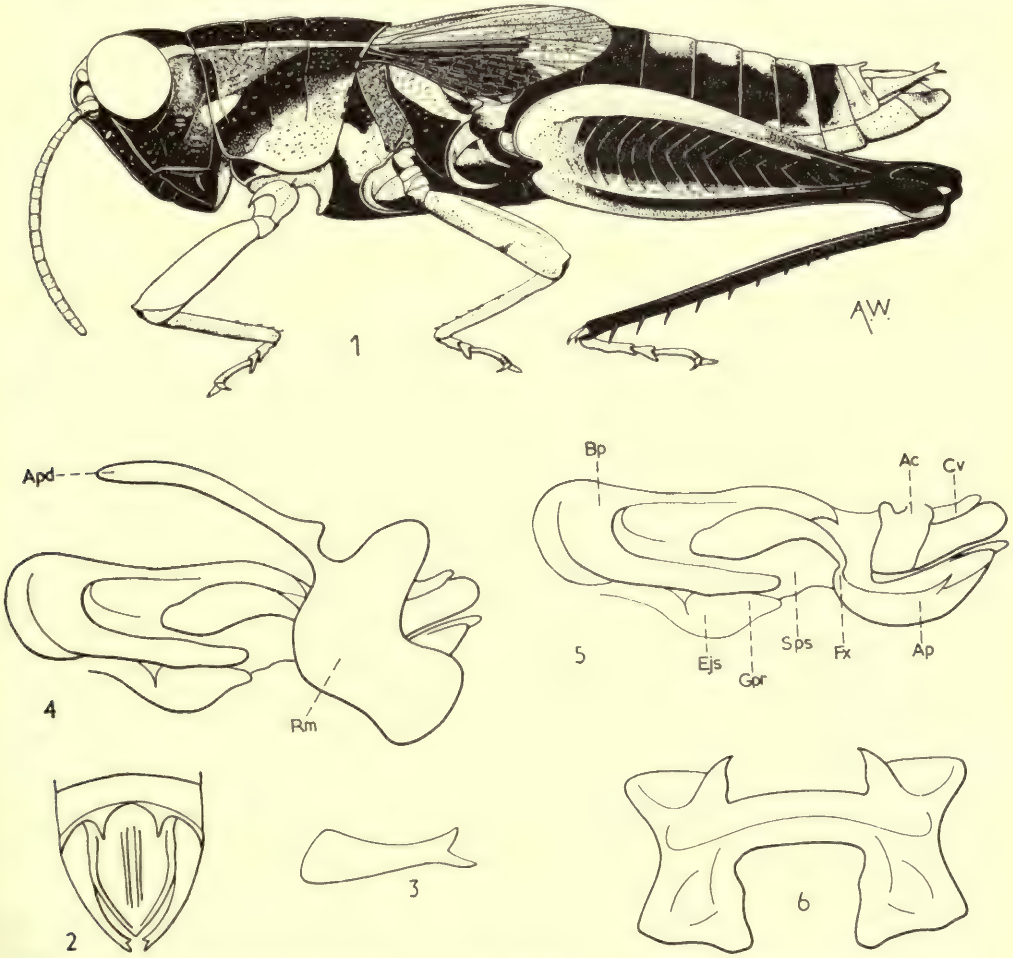

FIG. 36. *Paraserpusilla furcata* sp. n. 1, male, type. 2, end of abdomen, from above. 3, male cercus, lateral view. 4, phallic complex, with ectophallic membrane and epiphallus removed. 5, the same, with most part of cingulum removed. 6, epiphallus.

which in *Serpusilla* is always incurved and in the bifurcate male cercus, which in *Serpusilla* is conical. The structure of the phallic complex undoubtedly places the new genus in the Serpusiae group, but the epiphallus is rather unusual in its strongly developed lobiform lophi.

Paraserpusilla furcata sp. n.

(Text-fig. 36)

♂. Type. Antenna twenty-segmented. Dorsum of pronotum regularly, reticulately rugose ; a pair of concave callosities on sides ; lateral lobes slightly concave. General coloration brown. Scape and pedicel of antenna with dark brown spots. Lateral lobes of pronotum brown, shiny ; lower part ochraceous, and with small ochraceous spot on upper part of anterior margin. Elytron brown, with shiny dark brown spot, covering basal part of precostal area. External side of hind femur brownish ; lower and internal sides reddish, passing to brown on apical part. Hind tibia brownish.

Length of body ♂ 20, ♀ 31 ; pronotum ♂ 5, ♀ 7 ; elytron ♂ 6·8, ♀ 9·2 ; hind femur ♂ 12, ♀ 16·3 mm.

Madagascar Nord : Montagne des Français, det. Diego Suarez, ii.1959, 2 ♂ (including type), 1 ♀ (A. Robinson). Type in Paris Museum. One male paratype in the British Museum (Natural History).

MANANARA gen. n.

Of submedium size. Integument finely rugose, shiny and sparsely hairy. Antenna thin, filiform, much longer than head and pronotum together. Fastigium of vertex strongly sloping forwards, narrowing towards apex, and slightly longitudinally depressed in middle ; roundly merging with frontal ridge ; interocular distance one-third of the width of antennal scape ; vertex and occiput subglobular ; frons slightly oblique and incurved, with upper part protruding forwards ; frontal ridge low, roundly protruding above and constricted below ocellus. Pronotum slightly constricted in middle, widening backwards ; weak median carina present ; lateral carinae absent ; three sulci crossing dorsum ; metazona much shorter than prozona, its posterior margin obtusangular. Prosternal process short, acutely conical. Mesosternal interspace wider than its length. Elytra and wings shortened, reaching seventh abdominal tergite ; elytron with parchment-like, shiny membrane and thick, reduced venation and reticulation, its anterior margin regularly excurved, apex rounded ; wing widened, with strongly excurved external margin. Tympanum present. Hind femur exceeding end of abdomen ; external apical spine of hind tibia absent. Arolium large. Last abdominal tergite of male with pair of small, angular projections ; supra-anal plate angular, with obtuse apex ; cercus straight, acutely conical ; subgenital plate short, subconical, with obtuse apex. Basal valves of penis large, with very large gonopore processes ; apical valves large, connected with basal ones by thick flexure and forming strongly sclerotized proximal projections ; arch of cingulum and valves of cingulum large. Epiphallus with small angular ancorae and wide, lobiform lophi. Valves of ovipositor moderately long, narrow, slightly curved at apices.

Type species : *Mananara fasciata* sp. n.

The new genus in its pattern and coloration superficially resembles *Seyrigacris*, but differs strongly from it in the pronotum, which is widened towards the posterior end, in the presence of a median carina, shortened elytra and wings, in the absence of the external apical spine on the hind tibia and in the less elongated hind tarsi and straight, acutely conical male cercus.

***Mananara fasciata* sp. n.**

(Text-fig. 37)

♂. Type. General coloration brownish black, with ochraceous, narrow stripes on sides of head, pronotum and elytra, and above, along head and median carina of pronotum. Hind femur yellow on external side with two black transverse fasciae and small black spot at upper basal lobe; on internal side with similar pre-apical and incomplete median fasciae; knee blackish on both sides. Hind tibia blackish, with light greyish basal ring.

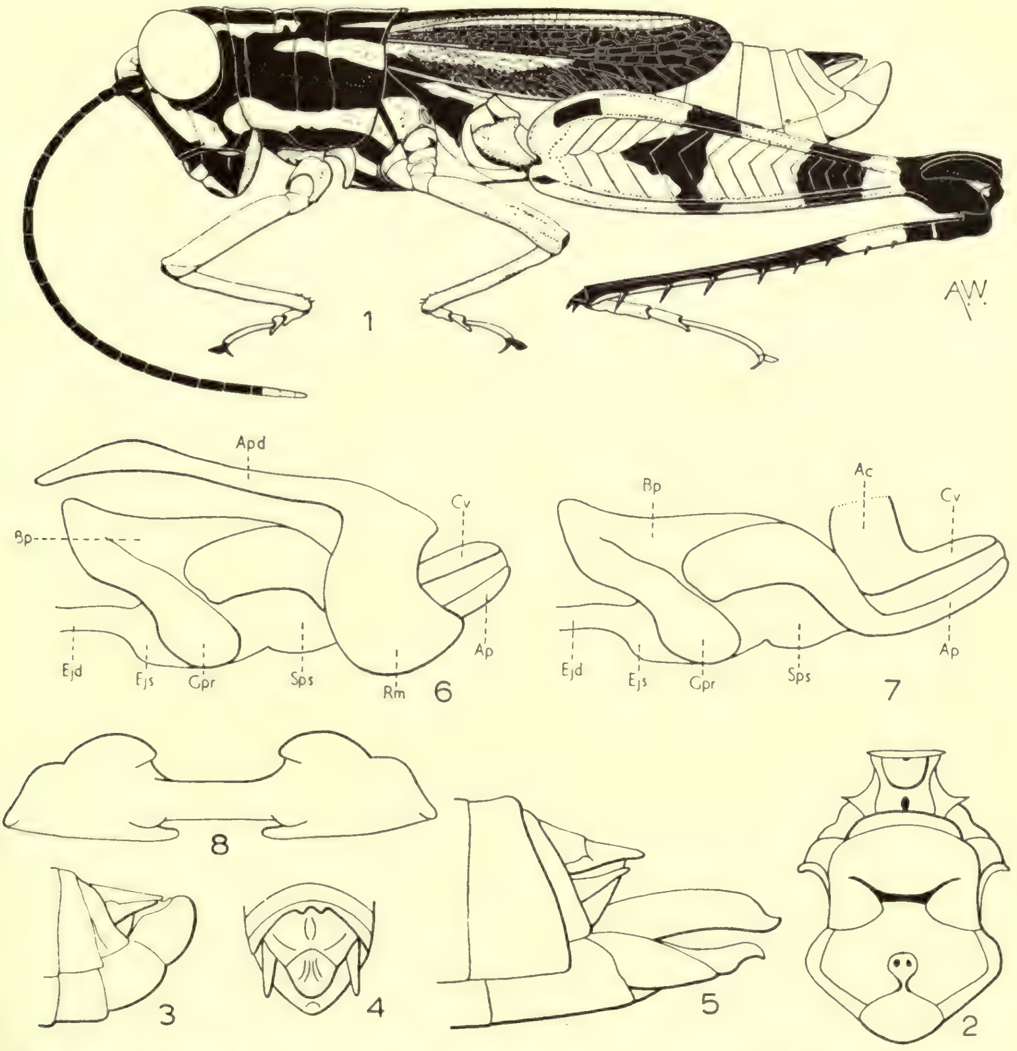

FIG. 37. *Mananara fasciata* sp. n. 1, male, type. 2, sternum. 3, end of male abdomen, lateral view. 4, the same, from above. 5, end of female abdomen, lateral view. 6, phallic complex, with ectophallic membrane and epiphallus removed. 7, the same, with most part of cingulum removed. 8, epiphallus.

♀. Paratype. As the male, but larger.

Length of body ♂ 18, ♀ 26 ; pronotum ♂ 4·5, ♀ 6 ; elytron ♂ 8, ♀ 11·2 ; hind femur ♂ 12, ♀ 14 mm.

Madagascar Est : Mananara, Nosy Mangabe, iv.1958, 1 ♂ type (E. Raharizonina) ; Ambohimakana, Manambato sur l'Anove, 1 ♀ (A. Robinson) ; Ile Sainte Marie, forêt de Kalalao, iii.1960, 1 ♂, 2 ♀ (A. Robinson).

Type and paratypes in Paris Museum. 1 ♂ and 1 ♀ paratypes in the British Museum (Natural History).

PERINETA gen. n.

Small or medium size and moderately robust. Integument rugose, shiny and sparsely hairy. Antenna filiform. Head slightly inflated, subconical, subglobular above ; fastigium of vertex narrowing forwards, with truncate apex, concave above ; frons oblique and slightly incurved ; frontal ridge low, slightly roundly protruding between antennae ; above and below ocellus sometimes with shallow depression. Eyes large, strongly convex ; interocular distance very narrow. Pronotum subcylindrical, widening backwards, without lateral carinae ; median carina forming two large, tubercle-like projections on prozona, obtuse on metazona ; three wide sulci crossing dorsum ; metazona less than half length of prozona, its posterior margin widely rounded, almost straight. Prosternal process widely conical. Mesosternal interspace wider than its length. Elytra lobiform, lateral, reaching third abdominal tergite. Tympanum present. Hind femur slender. External apical spine of hind tibia absent. Hind tarsus more than half length of tibia. Arolium large. Last abdominal tergite with slightly upcurved posterior margin. Supra-anal plate as wide as long, with excurved sides and slightly attenuate angular apex ; middle of apical half with pair of tubercles. Cercus compressed, narrowing towards strongly incurved apex. Subgenital plate, in profile, acutely conical ; from above, with squarely widened apex. Phallic organ robust. Basal and apical valves of penis connected by thin flexure. Apical valves of penis and valves of cingulum distally not covered by sheath. Arch of cingulum present, forming long posterior projections. Epiphallus bridge-shaped, with small angular ancorae and lobiform upcurved lophi.

Type species : *Perineta bicolor* sp. n.

Perineta bicolor sp. n.

(Text-fig. 38)

♂. Type. Interocular distance half width of antennae in middle. Occipital carinula present. Pronotum with low convexities on prozona ; lower margin of lateral lobes excurved in middle. Prosternal process with obtuse apex. Mesosternal interspace narrowing towards apex. Metasternal interspace inversely triangular. Apex of elytron rounded ; membrane thin, with reduced venation and reticulation. Supra-anal plate of male with shallow longitudinal sulcus in middle and upcurved sides. General coloration dark brown. Fastigium of vertex, frons in middle, gena under eye and labrum, with ochraceous spots. Pronotum with two pairs of wide ochraceous, longitudinal stripes interrupted in middle. Elytra pale ochraceous. Hind femur ochraceous, with three blackish, transverse fasciae on both sides ; hind knee brown, with ochraceous spot in middle of both sides. Hind tibia brown, with ochraceous ring on base and ochraceous spots on external side. Hind tarsus red.

Length of body 14, pronotum 3·5, elytron 3·7, hind femur 9·2 mm.

Madagascar Centre : Perinet, 1 ♂ type (in Paris Museum).

Subfamily **CYRTACANTHACRIDINAE**

KEY TO GENERA

1 (2) Prosternal process slightly inclined backwards. Body comparatively slender (Text-fig. 39) . . . . **RHADINACRIS** (p. 344)

2 (1) Prosternal process strongly curved backwards, almost touching mesosternum. Body comparatively robust.

3 (4) Costal area of elytra with fine and dense, wavy, elongated reticulation **NOMADACRIS** (p. 348)

4 (3) Costal area of elytra with usual net of reticulation.

5 (6) Dorsum of pronotum puncture-like sculptured. Membrane of elytra transparent (Text-fig. 40) . . . . **FINOTINA** (p. 344)

6 (5) Dorsum of pronotum smooth, with velvet-like texture. Membrane of elytra parchment-like . . . . **CYRTACANTHACRIS** (p. 346)

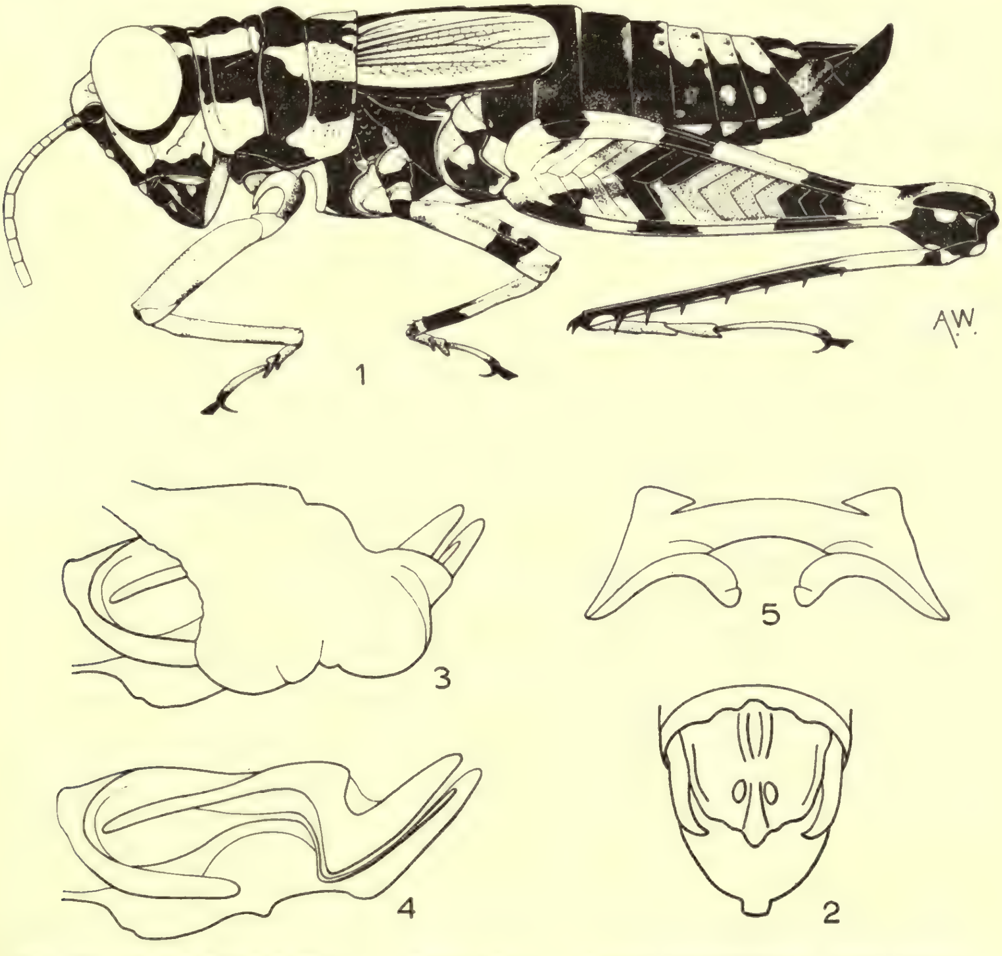

FIG. 38. *Perineta bicolor* sp. n. 1, male, type. 2, end of male abdomen, from above. 3, phallic complex, with part of ectophallic membrane and epiphallus removed. 4, the same with most part of cingulum removed. 5, epiphallus.

RHADINACRIS Uvarov, 1923

Large and slender. Integument moderately rugose and dotted. Antenna filiform, longer than head and pronotum together. Fastigium of vertex angular, with truncate apex, concave, with distinct marginal carinulae ; frons oblique, slightly excurved ; frontal ridge narrow, with parallel carinulae and shallow sulcus. Pronotum slightly saddle-shaped, constricted in middle ; three sulci crossing dorsum ; median carina linear obtuse, lateral carinae absent ; metazona about as long as prozona, its posterior margin widely obtusangular, almost rounded. Prosternal process subconical, slightly inclined backwards, with obtuse apex. Mesosternal interspace elongated, narrowing behind. Elytra long, narrow, much exceeding end of abdomen. Hind femur slender. Lower lobes of hind knee rounded. Arolium large. Last abdominal tergite of male with pair of small, widely rounded projections. Supra-anal plate elongate-angular, with attenuate apex. Cercus compressed, widely angular with acute apex. Subgenital plate elongate, acutely conical. Phallic complex robust ; apodemes short ; rami large ; basal and apical valves of penis connected by thick flexure ; apical valves of penis simple, narrow, acutangular ; valves of cingulum narrow ; arch of cingulum present ; gonopore process long. Epiphallus bridge-shaped, with small, rounded ancorae and large, lobiform, strongly upcurved lophi. Ovipositor short, with robust valves, slightly curved at apices. Subgenital plate with angular apex.

Type species : *Acridium schistocercoides* Brancsik, 1893.

Rhadinacris schistocercoides (Brancsik, 1893)

(Text-fig. 39)

Acridium schistocercoides Brancsik, 1893 : 192.
Rhadinacris schistocercoides (Brancsik, 1893) Uvarov, 1923 : 485.

♂. Large and very slender. Antenna twenty-five-segmented. General coloration brownish. Head above with ochraceous longitudinal stripe. Median carina of pronotum ochraceous ; lateral lobe of pronotum with olive-green curved, longitudinal stripe, lower part with oval ochraceous spot. Hind wing light blue. Hind femur light brownish ; upper side with two transverse fasciae ; external carinulae with small brownish spots ; hind tibia slightly purplish ; spines yellowish with dark brown apices.

♀. As male, but larger.

Length of body ♂ 33·5–39, ♀ 46–48 ; pronotum ♂ 6–6·3, ♀ 8–8·9 ; elytron ♂ 32·5–38, ♀ 44–52·5 ; hind femur ♂ 18–19, ♀ 24–27·5 mm.

Madagascar Centre : réserve naturelle de Zakamena, 1 ♀ ; Tananarive, Tsimbazaza, xii.1947, 1 ♀ (R. Paulian) ; Moramanga, Anjiro, v.1948, 1 ♀ (A. Robinson) ; Fianarantsoa, xi.1957, 1 ♀.

Madagascar Sud : lac Tsimanampetsotsa, v.1957, 1 ♂ (R. Paulian) ; Itampolo, v.1957, 2 ♂ (R. Paulian) ; Tranoroa, xii.1951 (R. Paulian) ; Beloha, 100 m., vi.1957 (A. Robinson) ; Ambovombe, Amboasary, iii.1960, 1 ♂ ; Betroka, 1 ♂ (R. Paulian) ; La Sakoa (R. P. Cattala).

FINOTINA Uvarov, 1924

Large, robust. Integument dotted. Antenna about as long as head and pronotum together. Fastigium of vertex trapezoidal, depressed in middle ; frontal ridge narrow, depressed at and below ocellus ; interocular distance wider than frontal ridge. Pronotum tectiform, with obtuse median carina crossed by three deep sulci. Metazona shorter than prozona, with angular posterior margin. Prosternal process strongly curved backwards, almost touching mesosternum, compressed at base, inflated in middle and obtusely conical at apex. Elytra exceeding end of abdomen, with transparent membrane and comparatively sparse reticulation, apex rounded. Male supra-anal plate trilobate, with small lateral and large angular apical lobe. Cercus

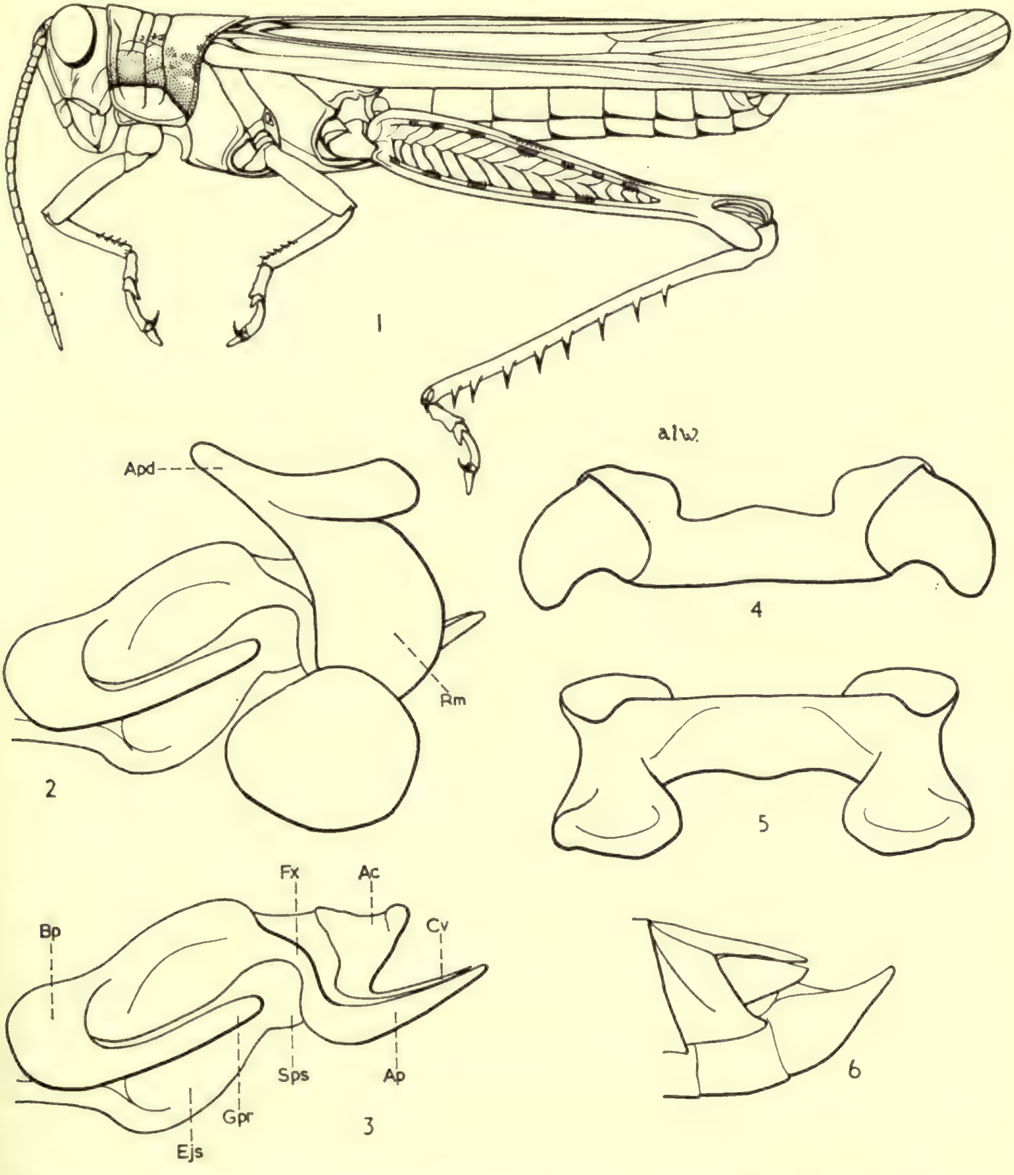

FIG. 39. *Rhadinacris schistocercoides* (Brancsik, 1893). 1, male. 2, phallic complex, with endophallic membrane and epiphallus removed. 3, the same, with most part of cingulum removed. 4, epiphallus, lophi in vertical position. 5, the same, lophi in horizontal position. 6, end of male abdomen, lateral view.

strongly compressed, widely angular, with acute apex. Subgenital plate elongated, acutely conical. Phallic complex robust. Rami of cingulum large. Sheath of penis absent. Basal and apical valves of penis connected by thick flexure. Apical valves of penis strongly elongated, with bilobate apex. Valves of cingulum absent. Arch of cingulum large. Epiphallus robust, with small ancorae and large elongate angular lophi. Ovipositor short, robust, with valves curved at apices. Subgenital plate with angular apex.

Type species : *Acridium ranavaloae* Finot, 1907.

Finotina radama (Brancsik, 1893)

(Text-fig. 40)

Acridium radama Brancsik, 1893 : 191.
Finotina radama (Brancsik, 1893) Uvarov, 1924 : 104.

♂. Large. Integument finely rugose and dotted. Median carina of pronotum sharp, linear. General coloration light green, without pattern. Upper external carinula of hind femur sometimes reddish. Hind knee sometimes with reddish crescentic spot. Hind tibia green, with spines reddish at apices.

♀. As the male, but larger.

Length of body ♂ 38–42, ♀ 43–57 ; pronotum ♂ 9–10, ♀ 11–15 ; elytron ♂ 35·5–36, ♀ 41–56·5 mm.

Madagascar Nord : Montagne d'Ambre, Les Roussettes, xii.1948, 1 ♀ (R. Paulian).

Madagascar Centre : Tananarive, Tsimbazaza, ii.1948, 1 ♀ ; iv.1948, 4 ♀ (R. Paulian) ; forêt de Didy, Andranomandevy, 1,039 m., x.1936, 1 ♀ (P. Griveaud).

Madagascar Est : Perinet iv.1948, 1 ♂, 1 ♀.

Madagascar Ouest : forêt de l'Ankarafantsika, Ampijoroa, 1 ♀. Type locality : Nosy Be.

Finotina ranavaloae (Finot, 1907)

Acridium ranavaloae Finot, 1907 : 257.
Finotina ranavaloae (Finot, 1907) Uvarov, 1924 : 105.

Differs from *Finotina radama* by less sharp median carina of pronotum, more slender body and general coloration, which is brownish with green stripe along head, pronotum and dorsal part of folded elytra. Lower lobe of hind knee greenish ; crescentic spot blackish ; hind tibia reddish, tibial spines whitish, brown at apices.

Length of body ♂ 35–36, ♀ 46–52 ; pronotum ♂ 9–9.5, ♀ 12–13 ; elytron ♂ 31–38, ♀ 43–48 ; hind femur ♂ 20–24, ♀ 26–27.5 mm.

Madagascar Est : Sambava, Marojejy, Ambinanitelo, 500 m., xii.1958, 1 ♀ (E. Raharizonina).

Madagascar Ouest : forêt de l'Ankarafantsika, i.1957, 1 ♀ (E. Razafimandimby).

Madagascar Sud Ouest : Sakaraha, Lambomakandro, iv.1960, 1 ♀. Type locality : Ile Sainte Marie.

CYRTACANTHACRIS Walker, 1870

Cyrtacanthacris tatarica tatarica (Linnaeus, 1758)

Gryllus Locusta tataricus Linnaeus, 1758 : 432.
Gryllus Locusta ranaceus Stoll, 1813 : 30 ; Uvarov, 1923 : 39.

Cyrtacanthacris concisa Walker, 1870 : 560 ; Uvarov, 1924 : 97.
Cyrtacanthacris subliturata Walker, 1870 : 565 ; Uvarov, 1924 : 97.
Cyrtacanthacris internexa Walker, 1870 : 613 ; Uvarov, 1924 : 97.
Cyrtacanthacris compta Walker, 1870 : 613 ; Uvarov, 1924 : 97.

Madagascar Est : Maroantsetre, Ambodivoangy, 1 ♀ (J. Vadon) ; Mahanoro, 1 ♀ (A. Molet).

Madagascar Ouest : Forêt de l'Ankarafantsika, Ampijoroa, 1 ♀ ; réserve naturelle de Namoroka, 1 ♀ (R. Paulian).

Madagascar Sud et Sud Ouest : Ankazoabo, le Banian, 70 m., vii.1957, 1 ♂ (P. Griveaud) ; Morombe, lac Iotry, 40 m., 8.vii.1957 (P. Griveaud) ; La Sakoa

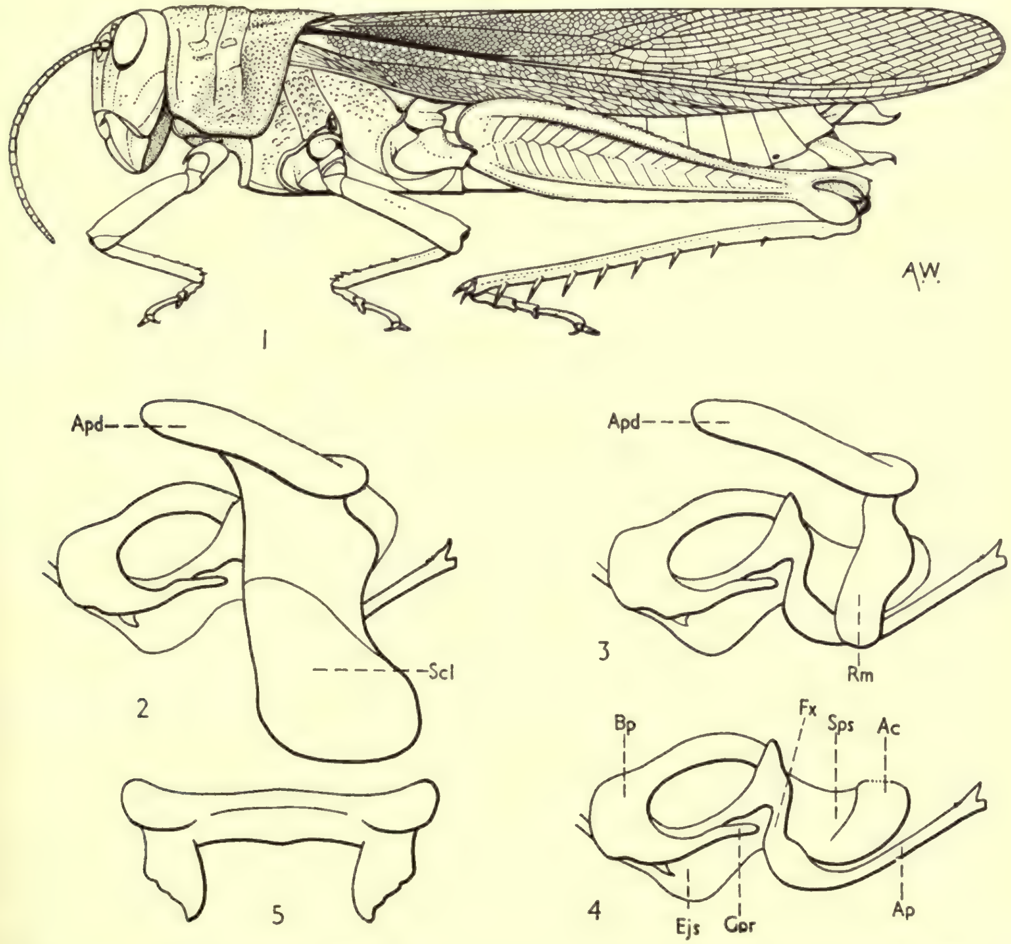

FIG. 40. *Finotina radama* (Brancsik, 1893). 1, female. 2, phallic complex, with ectophallic membrane and epiphallus removed. 3, the same, with lateral sclerotization of ectophallic membrane removed. 4, the same, with most part of cingulum removed. 5, epiphallus.

1 ♀; Beloha, 100 m., 27.vi.1957, 1 ♀ (P. Griveaud); Tsivory, 15.viii.1948, 1 ♀ (R. Paulin); lac Tsimanampetsotsa, v.1951, 1 ♀ (R. Paulian). Ile Europa, 1.ii. 1950, 1 ♀ (R. Paulian).

NOMADACRIS Uvarov, 1923

Nomadacris septemfasciata (Serville, 1838)

Acridium septemfasciatum Serville, 1838 : 661.
Acridium coangustatum Lucas, 1862 : 24 ; Uvarov, 1923 : 37.
Cyrtacanthacris fascifera Walker, 1870 : 558 ; Uvarov, 1923 : 37.
Cyrtacanthacris purpurifera Walker, 1870 : 561 ; Kirby, 1910 : 448.
Cyrtacanthacris subsellata Walker, 1870 : 559 ; Uvarov, 1923 : 37.
Acridium sanctae-mariae Finot, 1907 : 349 ; Uvarov, 1923 : 37.
Nomadacris septemfasciata (Serville, 1838) ; Uvarov, 1924 : 7.

Fort-Dauphin, Post Adm. Tsivory, Andobolava, xi.1959, 1 ♂, 4 ♀ (Randrimasy). Montagne d'Ambre, Lac Mandrit, Diego-Suarez, ix.1957, 1 ♂ (J. Elie). Tananarive, Tsimbazaza, 7.i.1948, 1 ♂. Manandrotsy, Betroka, 1 ♀ (J. Elie).

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NATURAL HISTORY

Pp. 351–377 ; 1 *Plate* ; 30 *Text-figures*

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NOTES ON *TUNGA CAECIGENA* (SIPHONAPTERA : TUNGIDAE)

By KARL JORDAN

EDITOR'S NOTE

A FEW years before his death Karl Jordan prepared the manuscript of a paper on a Chinese Jigger Flea, *Tunga caecigena* J. & R., the female of which lives embedded in the skin of its host. After describing the extreme specialization of this species to its environment and contrasting it with free-living fleas, Jordan postulated the existence of a species in which the degree of specialization was intermediate between the two extremes. Recently material of a jigger-like flea, a parasite of pangolins in Southern Rhodesia, was received by Mr. F. G. A. M. Smit, who realised that in its specialization to a sedentary mode of life it accords very closely with the condition postulated by Jordan. This species is described for the first time by Smit on p. 365 below.

This striking fulfilment of Jordan's forecast is believed to justify the publication in this context of his manuscript which, though finished in draft, together with the relevant drawings, he never finally prepared for publication. Most of it, indeed, was left in his minute and barely legible handwriting, and but for Mr. Smit's skill and diligence in deciphering it, might never have seen the light of day. As it stands, the manuscript contains indications that Jordan would have wished to modify it, perhaps substantially, before publication. There are, for example, passages in which the author discusses the possible causes of the adaptations he describes, speculative essays of a kind which rarely, if ever, occurred in his published work. While in fairness to the author such passages have been omitted, and some necessary alterations have been made to clarify the original text, everything possible has been done to preserve its factual content and the author's characteristic style.

Mr. Smit has appended references to recent papers relating to the subject and has also made corrections to the figures where these were indicated in pencil by Jordan. The original manuscript and a transcript are in the Entomological Library, British Museum (Natural History).

SYNOPSIS

The modifications of intracutaneous fleas, as exemplified by a Chinese jigger, *Tunga caecigena*, are described. The existence of a flea showing a degree of specialization intermediate between that of the Pulicidae and that of the Tungidae is postulated.

Though the public is in general not very observant about the habits of such small creatures as insects, the flea has drawn attention to itself not only by the prick of its mouthparts, which is a mere fleabite, but particularly by the great nimbleness with which the tormentor evades capture. Agility varying in degree in different genera is indeed an almost general characteristic of the Siphonaptera, and whoever has tried to catch *Pulex irritans* will agree that this agility is a real advantage to the individual flea and therefore to the species. Nevertheless, in some 40 species not far removed in relationship from the human flea the female has given up this advantage and taken to a sedentary life, attaching herself to the host in a selected place until the end of her egg-producing existence. It is obvious that during the period of transition in the evolution from an agile flea to an immobile one the species had a bad time until new adaptions were perfected by natural selection, such as the strengthening of the exoskeleton or the evolution of the habit to settle in a place on the host where the parasite is comparatively free from destruction by tooth, beak or claw. New adaptations have more than made good the loss of the advantage of mobility, the sedentary fleas being so flourishing that at least some of them have become pests.

It is to be expected that the great step from agility of the female to immobility is associated with modifications in the morphology. These modifications are considerable, but in observing them we must bear in mind that the question of cause and effect implies opposite possibilities, either the change of habit in these fleas having been followed by morphological modifications or some profound morphological variation having caused a change of habit.

There are two kinds of sedentary fleas : the extracutaneous stick-fast fleas which fasten themselves to the host by the laciniae and epipharynx (which together form the piercing-sucking tube), and the intracutaneous jiggers or sand-fleas which live in a cyst within the skin of the host. In both kinds the males retain mobility, but are also morphologically greatly modified. The jiggers may be called either the most advanced or the most degenerate of all fleas both in body and habits. Extremes far transcending the average are always instructive and for that reason I have selected a Chinese jigger as an illustration of the changes to which I have alluded. The existence of this species was first mentioned by W. F. H. Blandford who, in 1894, gave an account of specimens sent to the Entomological Society of London from Ningpo (90 miles south of Shanghai). He rather doubted the flea to be identical with the common South American sand-flea (*Tunga penetrans*), described the expanded specimens and their situation in the ear of sewer-rats (*Rattus norvegicus*) and mentioned some differences from *Tunga penetrans*. When we wrote a monograph of the Sarcopsyllidae (Jordan & Rothschild, 1906) we asked Blandford for the loan of the Chinese specimens, but they could not be found. However, in 1920 he came across a slide, which he presented to N. Charles Rothschild and from which we described the species *Tunga caecigena* (Jordan & Rothschild, 1921 : 131). The species was redescribed as *Dermatophilus lagrangei* Roubaud in 1925[1] and in 1930 Wu described and figured the ear nodules and the flea contained therein. Of 250 rats obtained by Wu at Soochow 55 *Rattus rattus* and 13 *Rattus norvegicus* were infested ; the flea was identified as *Tunga caecigena* by Riley (1932). A number of years ago I had the pleasure of receiving from Dr. Teng Pin Hui, Director of the South Fukien Plague Station, the ears of 13 rats (*Rattus rattus alexandrinus* and *R. norvegicus*) preserved in formalin and all containing *T. caecigena* ; the rats were collected in Futsing, South

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[1] Referred to as a synonym of *T. caecigena* by Sharif (1930 : 32).—F. S.

Fukien[2]. The consignment was most welcome, and I express here my sincere thanks to Dr. Hui and likewise to Dr. E. Landauer who had asked Dr. Hui to send the fleas to me. The total number of fleas in the 13 pairs of ears is nearly 190 (in various stages of postmetamorphic development), the highest number in one pair of ears being 31.

This series of specimens *in situ* enables me to supplement the previous accounts by describing in detail the growth and morphology of the adult female[3]. The internal morphology has only partially been studied ; that task is easier to accomplish with fresh specimens. . . .[4] All 190 specimens had entered from the ear's edge (Fig. 1). This restricted localization is interesting.[5] It is known of some agile species that they are found most frequently on definite parts of the body, one species for example on the neck and head, another on the rump ; the South American *Tunga caecata* (Enderlein, 1901), like the Chinese jigger confined to the ear of rats, enters the hind surface and not the edge. The female of *Tunga caecigena* arrives at the edge of the ear where it burrows into the skin and an environment is created in which it can safely accomplish the purpose of its life, the production of hundreds of eggs, each one of which is almost exactly as long as an unexpanded flea. The flea has only the laciniae and the epipharynx as implements for digging a hole. As the cuticle at the edge of a rat's ear is fairly thick, the flea—being only one millimetre long (Text-fig. 3)—will have disappeared inside before the sensitive portion of the skin is reached (Text-fig. 2*a*). . . .[6] In the large cysts containing specimens with the frontal end of the swollen abdomen projecting forward as four large humps, the bottom of the cyst shows the impression of the four humps and of the hole into which the mouthparts were inserted : a mould of the anterior end of the flea. The only connection with the outside is the hole by which the flea originally entered, the aperture growing larger with the flea, and the only part of the flea in contact with the atmosphere is the tail end which is but slightly below the surface of the skin of the host.

Among the fleas found in ears sent by Dr. Hui are a number of specimens of different sizes and appearance. In many of the rats' ears the cysts are so closely packed that they interfere with each other, thus apparently affecting the growth of

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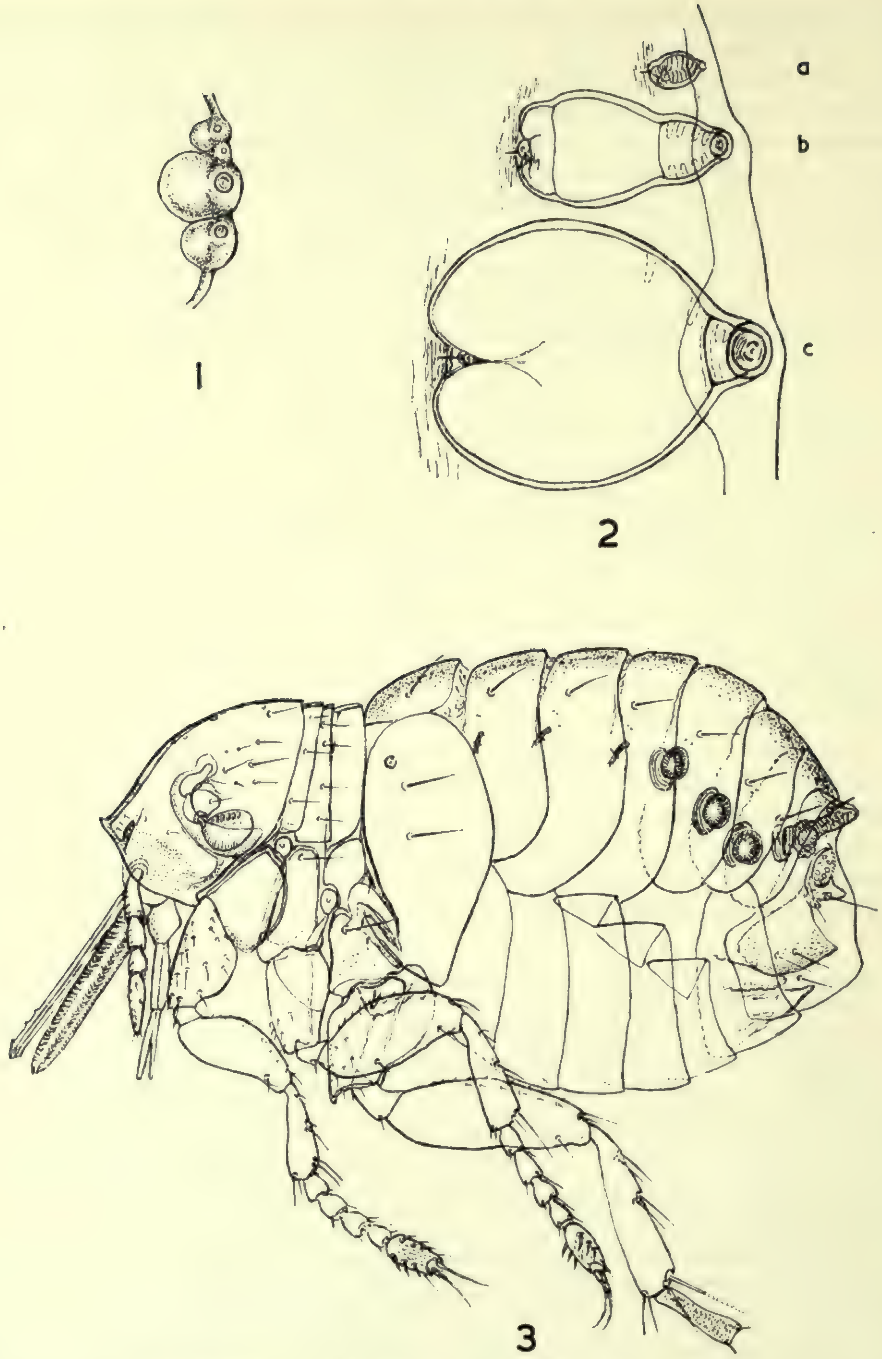
[2] No dates are mentioned on the labels. *Tunga caecigena* is known from the following localities in China : Ningpo (Chekiang) (Blandford, 1894 : 229), Shanghai (Roubaud, 1925 : 401), Dong Chia Hong, nr. Soochow (Kiangsu) (Wu, 1930 : 59), Wu Tung Chiao (Szechuan) (Li & Chin, 1957 : 120), Foochow (Fukien) (Yang, 1955 : 287), Futsing (Fukien). Dr. K. Sakaguti informs me that the species was introduced into Japan probably about 1940 and that it has been reported from Osaka (Morishita & Arai, 1949) and Nishinomiya, nr. Kôbe (Tanaka & Ikuzawa, 1951). Yang (1955 : 293) records *Rattus norvegicus* and *Rattus rattus* as the most important hosts, and also found *Tunga caecigena* on *Mus musculus*, *Suncus murinus* and an undetermined wild rat. He states that adult rats and shrews are more heavily infested than the young, and the difference in the infestation rate of the two sexes is statistically insignificant. The fleas are probably univoltine and are usually found in the cold season, the optimum temperature zone being between 50° and 60° F. The closely related *Tunga callida* Li & Chin, 1957, also, has been collected only during the period November to March.—F. S.

[3] The male *Tunga caecigena* has only recently been described (Chen & Ku, 1958).—F. S.

[4] In the passage here omitted the author suggests that the mode of copulation in *T. caecigena* is probably similar to that of *T. penetrans*, which has since been described by Geigy & Suter (1960 : 207, 208).—Ed.

[5] Yang (1955 : 293) states : " The parasites are generally found embedded at the edge of the rats' ears, but they may attack the dorsal surface of the hosts' ears." Yang's reference that " Once it was also found at the base of the tail of a specimen of *Rattus rattus* " may refer to the closely related *Tunga callida* Li & Chin, 1957 (from Yunnan), the females of which bury themselves at the rear end of the host, especially around the anus.—F. S.

[6] The author discusses the formation of the cyst (Text-figs. 2*b*, *c*) and surmises that " the expanding flea moulds the cyst and not the cyst the flea ".—Ed.



FIGS. 1–3. *Tunga caecigena* J. & R. 1. Part of ear of rat with four embedded fleas in various stages of postmetamorphic growth. 2. Cross-section of skin of rat's ear, showing embedded fleas in (*a*) the first stage of postmetamorphic growth, in (*b*) an intermediate stage and in (*c*) the final stage. 3. Whole female, cf. Fig. 2*a*.

some specimens. Though we have no proof that each individual of this flea goes through all the stages observed before it reaches its final shape and size, the evidence points in that direction. Text-figs. 4–10 represent these stages. The exoskeleton is almost intact in Text-fig. 4 ; in Text-fig. 5 the expansion of the abdomen has begun ; in Text-fig. 6 the membrane between terga I and IV is greatly extended and at segments II and III there is a constriction ; in Text-fig. 7 the anterior swelling between segments I and II already conceals part of the thorax and the second constriction has shifted backwards ;[7] in Text-fig. 8 a small swelling appears all round the thorax, a sort of cushion on which lie the thorax and head ; Text-fig. 9 shows a fully distended female in which the anterior swellings, two each side, completely conceal the head and thorax in lateral aspect[8] but they are visible in a view from the front or slightly askew (Text-fig. 10).[9]

I have taken about half the number of specimens out of their cysts, and left the others *in situ*. Most specimens have attained full size or nearly, but about 20 are small and look to me as if they represent the first stages in the individual growth from the non-expanded female to the fully expanded one. The smallish specimens vary a good deal in shape and this may partially be due to overcrowding.

The exoskeleton of an adult insect, being a finished product, does not grow any more and is not affected, apart from degeneration, by the expansion of the volume of the body necessitated in many female insects by the development of the great number of comparatively large eggs in the abdomen. Head, thorax and their appendages are the same size in the unexpanded jigger female (Text-figs. *2a*, 3) as in the fully expanded specimen of over 8 mm. (Text-fig. *2c*). However, the life in the cyst has a remarkable effect on the legs in jigger fleas, the tarsi, tibiae and femora disappearing partially or completely, the process beginning with the hind tarsi (cf. Wagner, 1932 : 249). In the series of some 90 specimens of the Chinese jigger only a few have one complete tarsus, and not a single one has a complete hind tarsus.[10] Only the first segment is preserved in the hind leg of one specimen and this exhibits strong signs of degeneration (Text-fig. 3).[11] . . . [12] This process seems to set in soon after the skin of the host is entered, for the unexpanded and only slightly expanded specimens (Text-figs. 4–6) have already lost all tarsi. The small degree of expansion in these females, however, may be due at least partially to overcrowding.

The enlargement of the abdominal cavity is made possible by the postmetamorphic growth of the intersegmental membranes as in all adult insects with secondarily enlarged abdomen, such as the queen termite, the oil-beetle (*Meloë*), and repletes of honey ants. But the growth of the jigger female differs essentially in the abdomen being transformed into a different shape, affecting the function of the segments,

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[7] This figure closely resembles that given by Yang (1955 : fig. 1).—F. S.

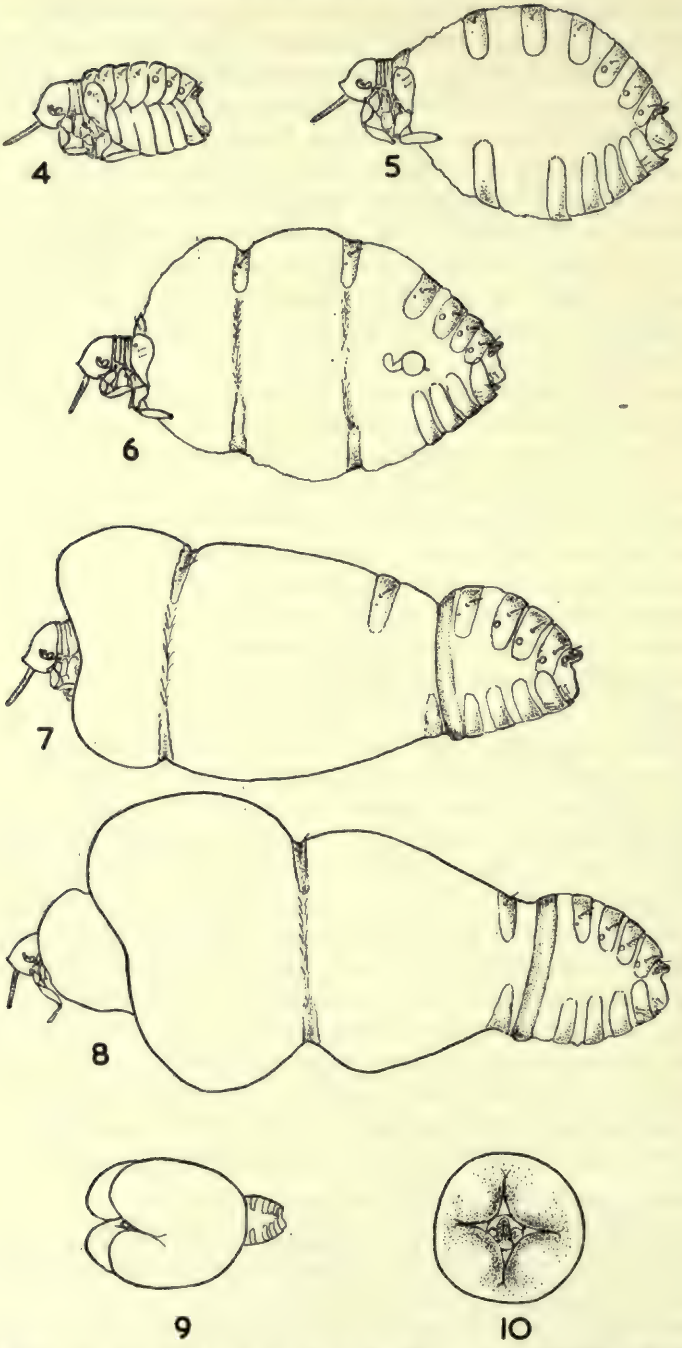
[8] A slightly different version of this drawing was published by Jordan (1948 : fig. 129D).—F. S.

[9] In the closely related *Tunga callida* the gravid females are spherical, but they expand much more on the dorsal side than on the ventral, while the segments posterior to the fifth are elevated to form a characteristic button-like anal projection (Li & Chin, 1957 : 120).—F. S.

[10] The hind tarsus of male *Tunga caecigena* is figured by Chen & Ku (1958 : figs. 1, 8).—F. S.

[11] Some species lose parts of their legs more readily than others, *e.g.* in embedded females of *Tunga penetrans* the legs are usually all intact, even in the final stage of expansion. Are parts of the legs lost in certain species during the act of burrowing into the skin ? If those parts are shed after this process one would expect to find remnants in the cyst.—F. S.

[12] The author suggests possible reasons to account for the loss of parts of the legs.—Ed.



FIGS. 4–10. *Tunga caecigena* J. & R. in various stages of postmetamorphic development; explanations in text. (Actual size of specimen shown in Fig. 4 : 1 mm.; in Fig. 5 : 2 mm.; in Fig. 6 : 2·6 mm.; in Fig. 7 : 3·4 mm.; in Fig. 8 : 5 mm. Figure 8 drawn to a somewhat smaller scale than Figs. 4–7 ; Figures 9 and 10 drawn to a much smaller scale.)

segments I, II and III becoming merely an expanded container and IV–X being consolidated into a tough truncate cone and serving as the only connection of the parasite with the outside world. It is a teleomorphosis of form affecting function.

As will be evident from a comparison of Text-figs. 5–7, the intersegmental membrane between tergites I to III and between thorax and sternites II and III (there is no sternite I in fleas) are the first to grow longer and expand all round, tergite I remaining attached to the thorax. In Text-fig. 7 tergites II and III have travelled backwards, and a tough belt is formed in front of the two sclerites of segment IV, the specimen being here constricted and remaining so ; the anterior part of the abdomen has swollen forward. In Text-fig. 8 the head and thorax are on a cushion-like swelling, which later on becomes smaller—the specimen is still constricted at segment II. Further expansion breaks the constriction at segment II and the swelling extends far beyond the head, forming anteriorly on each side two dome-shaped projections, one tergopleural, the other sterno-pleural (Text-fig. 9) ; the slits between these four humps form an erect cross (Text-fig. 10) ; in a frontal view the head and thorax are seen deep down in the centre of the cross. The four humps are not always of equal width and length, but are always present in expanded specimens, being a specific distinction of the Chinese jigger.[13] Among the American species, *Tunga terasma* Jordan, 1937, likewise has four humps, which, however, are directed sideways, somewhat in the manner of the arms of an X, the head and thorax not being concealed.

After the formation of the belt (Text-fig. 7) in front of the sclerites of segment IV, the anal cone undergoes very little change. The tergal plates are well separated from the sternal ones and their dorsal and ventral parts, respectively, often show stronger chitinization. The cone is firmer than the enlarged part of the abdomen, which is chiefly due to the large number of muscles which extend from the segments of the cone forward to the thorax. The cone varies slightly in length, being shorter in some specimens than in others. In a view from behind the cone is occasionally surrounded by a brown ring formed by the faeces (remnants of the blood of the host) as in females of other species of *Tunga*. The exposed area encircled by this brown ring appears often to be lower than the margin of the aperture in the host's skin and has erroneously been termed a cloaca by various authors. As in all fleas, the rectum and the oviduct have separate orifices, the anus being situated between the tergite and the sternite of segment X and the oviduct opening between sternites VIII and IX.

The majority of female Tunginae have no distinct line of demarcation between tergites IX and X, the two segments being fused. In a lateral view (Text-fig. 12) the triangular sclerite projecting backwards from the sensilium represents the tergum of segment X and the lateral short projection with a long apical bristle the tergopleurite homologous to the stylet present in the large majority of fleas ; below this pleurite there is a separate narrow sclerite bearing some bristles which is sternite X. In a view vertically on to the terminal surface of the cone (Text-fig. 13) sternum X appears as a narrow transverse bar bearing right and left a pair of bristles ; the apex of the combined tergites IX and X is deeply sinuate and the backward projection each side of the sinus is much foreshortened ; the anus is situated above sternum X.

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[13] See footnote 9.

The midgut of swollen and large specimens is folded twice, thus being divided into three parts as shown in Text-fig. 11.[14]

A problem which has remained obscure to me concerns the means of transporting the eggs from all parts of the large abdomen to the oviduct. Schimkewitsch (1884 : 673) found only two longitudinal muscles in *Tunga penetrans*.[15] Though the number of muscles is much larger in the Chinese jigger, I do not see how, in fleas which are often placed in the ear with the head downwards, the longitudinal muscles can guide the eggs from the anterior humps upward to the anal cone without the co-ordinated help of the transverse or ring muscles.[16] However it may be accomplished, eggs do arrive in the oviduct and are ejected. As the transverse diameter of the ripe egg is much greater than the diameter of the oviduct, the passage of the eggs is only possible because the structure of the anal cone admits considerable expansion in width. The two segments chiefly concerned in the process of egg-ejection are the tergite and sternite of segment VIII and the sternite of segment IX. Tergite VIII is divided dorsally in the median line into a right and left sclerite, which extend downward to or near to the ventral surface of the abdomen. Other tergites are not halved (the apical margin of tergite VII is in some specimens slightly or more deeply incised medially). From the spiracle downwards tergite VIII widens considerably and in unexpanded specimens the lower areas of the right and left halves approach one another ; on the outer surface of the lower area there are three or four bristles and on the inner surface about half a dozen directed inward-distad (Text-fig. 13 ; the two halves are drawn as they appear in the specimen, the left half being more flattened and expanded in the preparation than the right half ; Text-fig. 12, lateral aspect). Sternite VIII lies in between the two halves of tergite VIII ; it differs much from the corresponding segment of the American jiggers[17] by being soft and tough, and ends in a pointed sclerotized cone. Below and in front of it lies sternite VII (Text-figs. 12, 13), which is divided medially and bears right and left two bristles, sometimes one. At the side of sternite VIII are two humps, flexible like the main body of st. VIII, and above the sternum is the orifice of the oviduct. The upper wall of the terminal part of the oviduct is formed by a large sclerite homologous to sternum IX and this is a special feature of the species of Tunginae. This sclerite extends from the ventral margin of tergite IX downward, forming a kind of half cylinder resembling an elastic plate or a piece of paper of which two opposite margins are bent towards each other. The cavity thus formed is closed on the frontal side by the intersegmental membrane connecting sternum IX with X. The pressure exercised on the egg by the muscles of the abdomen will push the egg to the end of the oviduct where it is held between sterna IX and VIII and the stiff bristles on the inside of the right and left halves of tergite VIII. The egg pressing against the convex surface of the elastic sternum IX, bends this

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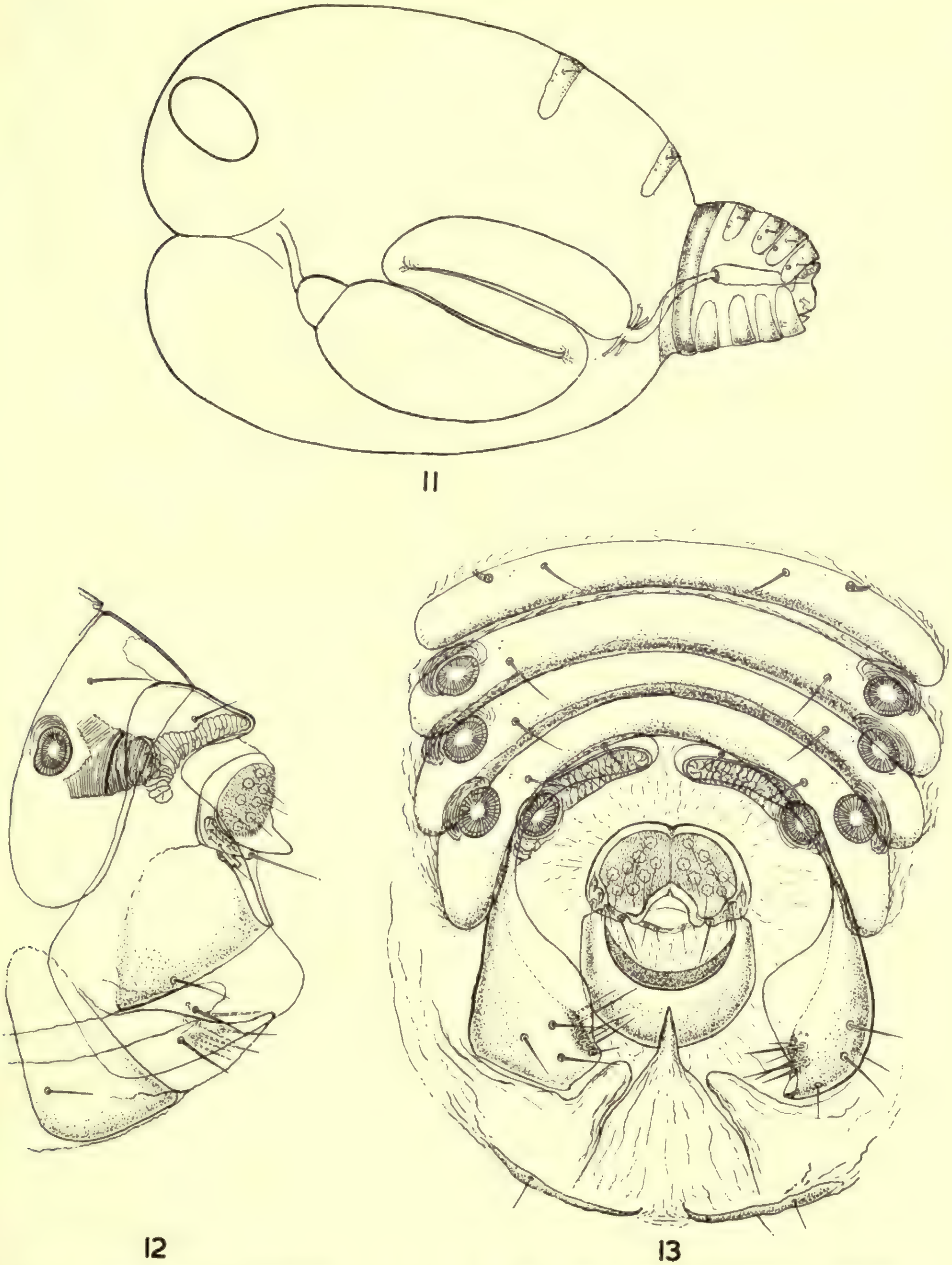
[14] In fully distended specimens of *Tunga penetrans* the midgut is folded four times (Geigy & Herbig, 1949).—F. S.

[15] Geigy & Herbig (1949) found, apart from the hemispherical muscles, only one central muscle cord in the abdomen of inflated specimens of *Tunga penetrans*.—F. S.

[16] It would seem that the pressure inside an ovariole, caused by the process of egg-growth, is sufficient to push the eggs forward till they reach the oviduct, whence the exertion of muscular power will be necessary only for the ejection of the eggs.—F. S.

[17] In female *Tunga penetrans* sternum VIII appears to be entirely membranous ; I have not been able to detect it in any mounted specimens.—F. S.



FIGS. 11–13. *Tunga caecigena* J. & R. 11. Flea in final stage of expansion, showing alimentary canal and a full-sized egg in upper left part of abdomen. 12. Terminal abdominal segments of female in lateral view. 13. Same segments as viewed from behind.

surface upward (there is an egg in this position in one of the specimens of this flea) and now a further effort of the muscles would be assisted by the elastic force of sternum IX and of the bristles of tergum VIII and achieve the ejection of the egg.

The third function of the anal cone is the provision of air for the greatly enlarged abdominal tracheal system by means of enlarged spiracles. Spiracles, as part of the exoskeleton, cannot be enlarged by postmetamorphic growth of the individual; their enlargement can only be due to the result of the evolution of the species. In the process of postmetamorphic growth, however, shifting of the segments bearing the enlarged spiracles has kept the posterior four of them (on segments V to VIII) in contact with the atmosphere, whereas the anterior series are in the cavity and therefore shut off from the atmosphere. The three spiracles of segments II to IV have hitherto been considered absent. If they were as minute in the Chinese jigger as they are in *Tunga penetrans*[18] I should very likely not have discovered them. Nature has provided two guides with the help of which the vestiges of these spiracles can be found, provided the process of clearing the specimens for the balsam preparation has not altogether destroyed the trachea of which the spiracle is the aperture. The guides alluded to are a bristle and a pair of minute dots [leucodiscs]. The abdominal terga I–VIII of the jiggers, inclusive of the male of *T. penetrans*, each has one subdorsal bristle. That this bristle is present on segment VIII is contrary to what one would have expected, there being no bristle above spiracle VIII in any of the fairly numerous

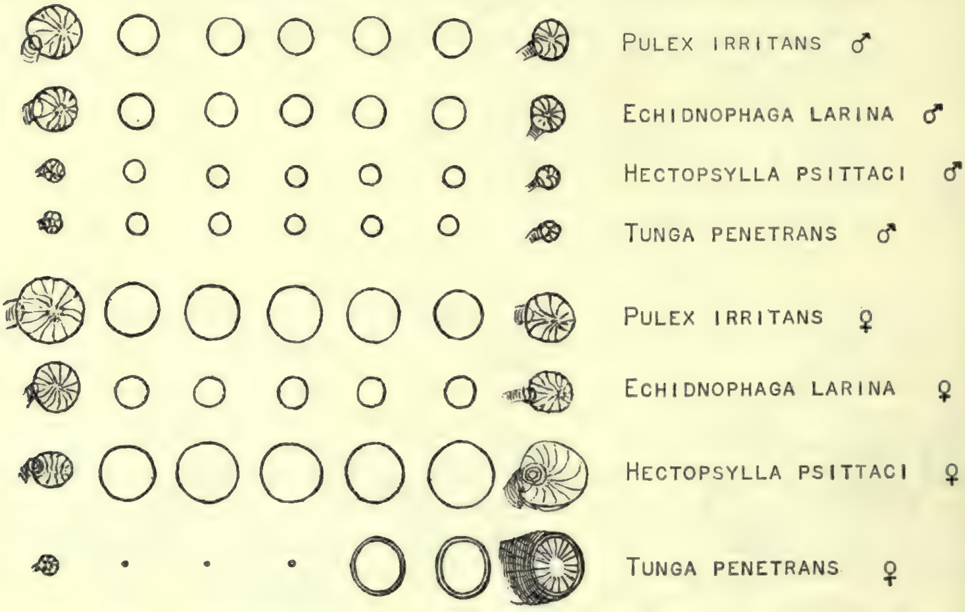


FIG. 14. Abdominal spiracular fossae of metepimeron and terga I–VII of four species of Pulicid fleas.

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[18] I have failed to detect vestiges of spiracular fossae on terga II–IV in mounted female specimens of *Tunga penetrans*.—F. S.

species of the group of Siphonaptera to which *Tunga* must be assigned, whereas one or more bristles are present above the stigma of VIII in many species of other groups of fleas with which *Tunga* is much more distantly related than for instance with *Hectopsylla*. Nor can I look upon that bristle as a character which was lost in the ancestors of the Tunginae and has reappeared. The development of the bristle on tergite VIII is most probably due to isomerism, a detail repeated on every segment. However that may be, a little more downward and forward from the bristle there are two transparent dots, sensory cups, and below these we find the vestigial spiracle (Text-fig. 3). The somewhat larger size of the remnants in the Chinese jigger may be taken as evidence that there have existed—and possibly there still exist—species in which these anterior abdominal spiracles approached the size of the first abdominal one (on the metepimeron).[19] That is to say the reduction of spiracles II–IV and the compensating enlargement of spiracles V–VII took place gradually or step by step. Is there any other evidence bearing on this suggestion ?

A comparison of the male spiracles of *T. penetrans* proves that this process in their evolution was confined to the female (Text-fig. 14) ; the series of rings, drawn to scale (spiracle of tergum VIII omitted), shows neither reduction in II–IV nor enlargement in V–VII ; the first spiracle, on the metepimeron, is the same size as the following ones.

In the male of Hectopsyllinae (Text-fig. 14) the proportional size of the spiracles is again the same as in male *T. penetrans* ; in all females, however, II–VII are larger than I and increase in size from II to VII. The Hectopsyllinae and the Tunginae are the only fleas in which the abdominal spiracle I of the female is much smaller than the spiracles of V–VII ; in all other fleas spiracle I is as large as the following ones or larger. This evidence of the existence, in the female of the Tungidae, of a disposition toward the evolution of enlarged abdominal spiracles explains the exceptionally great size of spiracles V–VII in the jigger females. No other fleas show a corresponding trend towards the elimination of spiracles II–IV. The degeneration of these spiracles, therefore, must be attributed to the loss of function.

The Chinese jigger is in some respects of a more generalized type than the five American species of *Tunga*. It is therefore not far fetched to assume the existence of a jigger which only partially enters the skin of the host. We should expect to find in such a species the abdominal spiracle II in the process of degenerating, III and IV to be perhaps of the same size as in the male and V–VII more or less enlarged : a first step in the modification of the spiracles.[20] It may be left to the imagination of the reader to reconstruct the further steps to be passed before the evolution of the jigger females as we now know them.

[19] There is now one such species known ; see below, p. 375.—F. S.

[20] See footnote 19.

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NEOTUNGA EULOIDEA GEN. N., SP. N. (SIPHONAPTERA : PULICIDAE)

By F. G. A. M. SMIT

SYNOPSIS

A new species of flea, parasitic on pangolins, and showing both pulicid and tungid characters, is described.

THE pangolin *Manis temmincki* Smuts is widespread in southern and eastern Africa, but never common nor very easy to collect. In 1956, a female pangolin, captured in the Sinoia District of Southern Rhodesia, was brought to the University College of Rhodesia and Nyasaland at Salisbury, where it was kept alive for two years. After it had died, in August 1958, Dr. J. S. Weir of the Zoology Department examined the body and found a number of jigger-like fleas embedded in the skin of the underside of the animal. An appeal made by Dr. Weir to some members of the staff of the National Museum of Southern Rhodesia, at Bulawayo, for more fleas and other parasites of pangolins resulted in six additional specimens of the same flea collected by Mr. M. P. Stuart Irwin from a pangolin caught near Lonely Mine, Southern Rhodesia, in June 1960. Dr. Weir sent three of these specimens to Dr. L. H. Finlayson of the Department of Zoology, University of Birmingham, with the request to have this material identified. I am deeply indebted to Dr. Finlayson for having sent the specimens to the British Museum (Natural History), for these fleas have proved to be the most interesting and instructive new species which has ever come my way. According to recent classifications this flea belongs to one Family (or Subfamily) on the structure of head and thorax, and to another Family (or Subfamily) on most of the characteristics of the abdomen.

I am most grateful to the gentlemen mentioned above for having made an important discovery and for the generosity with which they have placed all specimens at my disposal.

Meanwhile Dr. Weir collected twelve more females from a pangolin captured near Que Que, also in Southern Rhodesia. All the fleas so far collected are females. The males, which are very likely minute and free-living, should be searched for in the nesting places of pangolins, which might be difficult to detect. I sincerely hope that Dr. Weir and Mr. Stuart Irwin will eventually discover the male specimens which they so kindly offered to search for, as the structure of the genitalia of the male would give valuable supporting evidence of the origin of sand-fleas.

NEOTUNGA gen. n.

Chaetotaxy reduced. Frontal margin of head angulate, with an upward pointing tubercle. Eye developed, sometimes with an internal sinus. First two segments of antennal clava lamellate, the other segments fused. Epipharynx with a number of minute tubercles along anterior margin ;

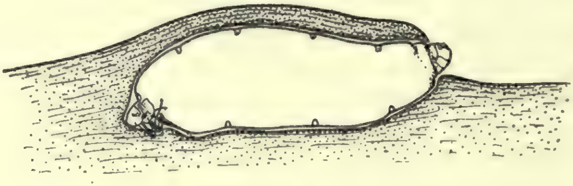
laciniae strongly serrated ; labial palp membranous. Maxillary stipes of median size, extending below genal margin. Thorax dorsally narrower than length of tergum I. Prosternosome with epimeral flange ventrally drawn out into a triangular lobe ; mesosternal furca long and narrow. Metasternal ridge with a semi-distinct forward branch. Vincula absent. Oblique hyaline break of mid coxa complete. Hind coxa with a patch of spiniforms on inner side and with a ventro-anterior spur. *Female :* spiracular fossa of posterior terga larger than those of anterior terga ; two leucodiscs above spiracular fossae. Antesensilial setae absent. No seta above the large spiracular fossa of tergum VIII. Genital setae of tergum VIII well developed. Sternum IX membranous. Sensilium not divided dorsally, with eight trichobothria each side. Anal tergum not much reduced, with a short but stout stylet. Spermatheca rather large, with a dorsal orifice ; without a line of demarcation between bulga and hilla.

Type of genus: *Neotunga euloidea* sp. n.

Neotunga euloidea sp. n.

(Text-figs. 1–3, 6–12, 15, 16. Pl. 1)

Holotype female and 10 female paratypes from Southern Rhodesia, Sinoia District : on *Manis temmincki* (adult ♀), viii.1958 (*J. S. Weir*) ; 6 female paratypes from Southern Rhodesia, Lonely Mine, 19° 30′ S., 28° 42′ E. : on *Manis temmincki*,



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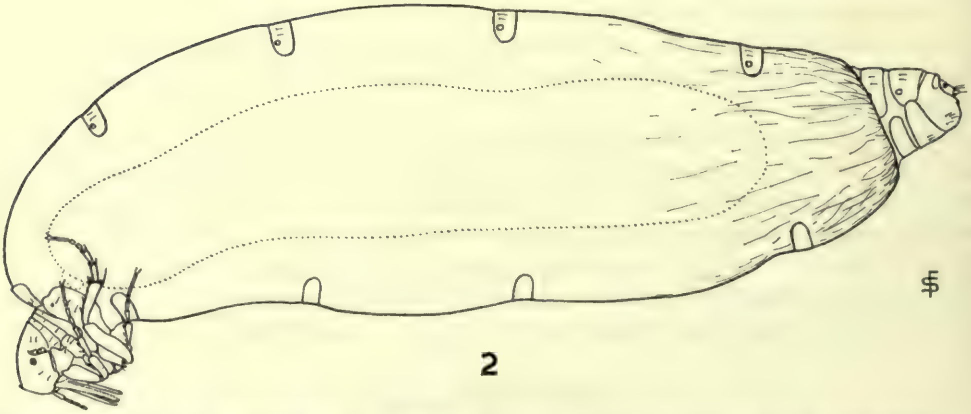

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Figs. 1–2. *Neotunga euloidea* sp. nov. 1. Embedded female under the skin of *Manis temmincki*. 2. Expanded female removed from under the skin (the midgut is shown in dotted outline).

30.vi.1960, (*M. P. Stuart Irwin*) ; 12 female paratypes from SOUTHERN RHODESIA, 15 miles S.E. of Que Que : on *Manis temmincki* (adult ♀), 21.x.1960 (*J. S. Weir*).

Holotype and a number of paratypes in the British Museum (Tring), other paratypes in the collection of Lt.-Col. R. Traub, Washington, D.C.; the Canadian National Collection of Insects, Ottawa ; the University College of Rhodesia and Nyasaland, Salisbury ; the National Museum of Rhodesia and Nyasaland, Bulawayo ; the Antiplague Research Institute, Stavropol and the Schweizerisches Tropeninstitut, Basel.

As no other species of *Neotunga* are known, the generic characters may be taken as diagnostic for the species.

Head (Text-fig. 3). Frons angulate, with a distinct vertical tubercle ; dorsal margin of head about twice as long as the frontal margin below the tubercle. Wall of cranium fairly thick. Ventral margin of head with a broad rounded genal lobe. Preoral tuber not excessively large. Ocular seta very small, placed below level of eye ; genal seta slightly larger than the ocular one. Occipital region with two setae. A number of microsetae, most of which are pointing upwards, on frontal and dorso-occipital regions. Eye well developed, subglobular, but not very large, with or without an internal sinus. Antennal scape with one minute ventroposterior seta ; pedicel with about half a dozen longish setae which do not reach to the apex of the clava ; first two segments of clava lamellate, the other segments completely fused ; on outer surface of clava only a few minute setae. Anterior longitudinal half of antennal fossa covered by the flange-like extension of the postocular genal margin which thus covers the anterior half of the antenna. No setae bordering the antennal fossa dorso-posteriorly. One leucodisc, representing a placoid, on the preantennal region of head, three on the postantennal region. First segment of maxillary palp nearly twice as long as the second segment, third segment as long as second, fourth segment a little longer than the third ; the palp reaches nearly to the level of the apex of the fore coxa : stipes short, but still protruding well below the genal margin. Epipharynx fairly broad, with small projections over most of the length of the anterior margin ; lacinia very broad and with strong anterior and posterior serrations ; the two-segmented labial palp is membranous—these three mouth-parts are about 1½ times as long as the fore coxa.

Thorax (Text-fig. 3). Thorax dorsally only about half as long as tergum I ; pronotum and mesonotum dorsally of the same length, metanotum nearly twice the length of either of the first two nota ; there is no fusion between the nota. Pronotum with four slender setae each side, mesonotum with two setae and metanotum with one subdorsal seta each side. Flange of prosternosome with a triangular lobe pointing backward, mesosternosome with two setae. Metasternum without setae, metepimeron with a row of three slender setae. Pleural arch-joint of metathorax and the associated metanotal and pleural ridge well developed.

Legs (Text-figs. 3, 6–8). Setae on outer surface of fore coxa not very numerous and most of them are small. Outer surface of mid coxa with an oblique hyaline break and a relatively small number of very short setae at and near the anterior margin, on inner side a few similar setae. Hind coxa with short setae scattered over the outer surface ; on the inner surface, apart from some thin setae, an oblique dense patch of short spiniforms. Ventro-anterior angle of hind coxa drawn out into a pointed triangular tooth. Outer internal rod and inner internal ridge of hind coxa not strongly developed. Femora with a number of small setae along the dorsal margin ; on inner surface with one lateral seta on proximal part of fore femur with two such setae on mid and hind femur ; all femora with one preapical lateral seta on inner surface. Tibiae with two notches in posterior margin each of which bearing two short setae the outer one of which is the stoutest ; without lateral setae ; ventro-anterior angle of tibiae with two setae, ventro-posterior angle with two setae on fore and mid tibia, three on hind tibia.

Tarsi as shown in Text-figs. 6–8 ; note the reduced chaetotaxy, especially of the fifth tarsal segments which only bear one pair of thin sub-basal plantar setae, one pair of preapical plantar setae and the usual pair of preapical lateral setae ; claws basally with only a slight swelling.

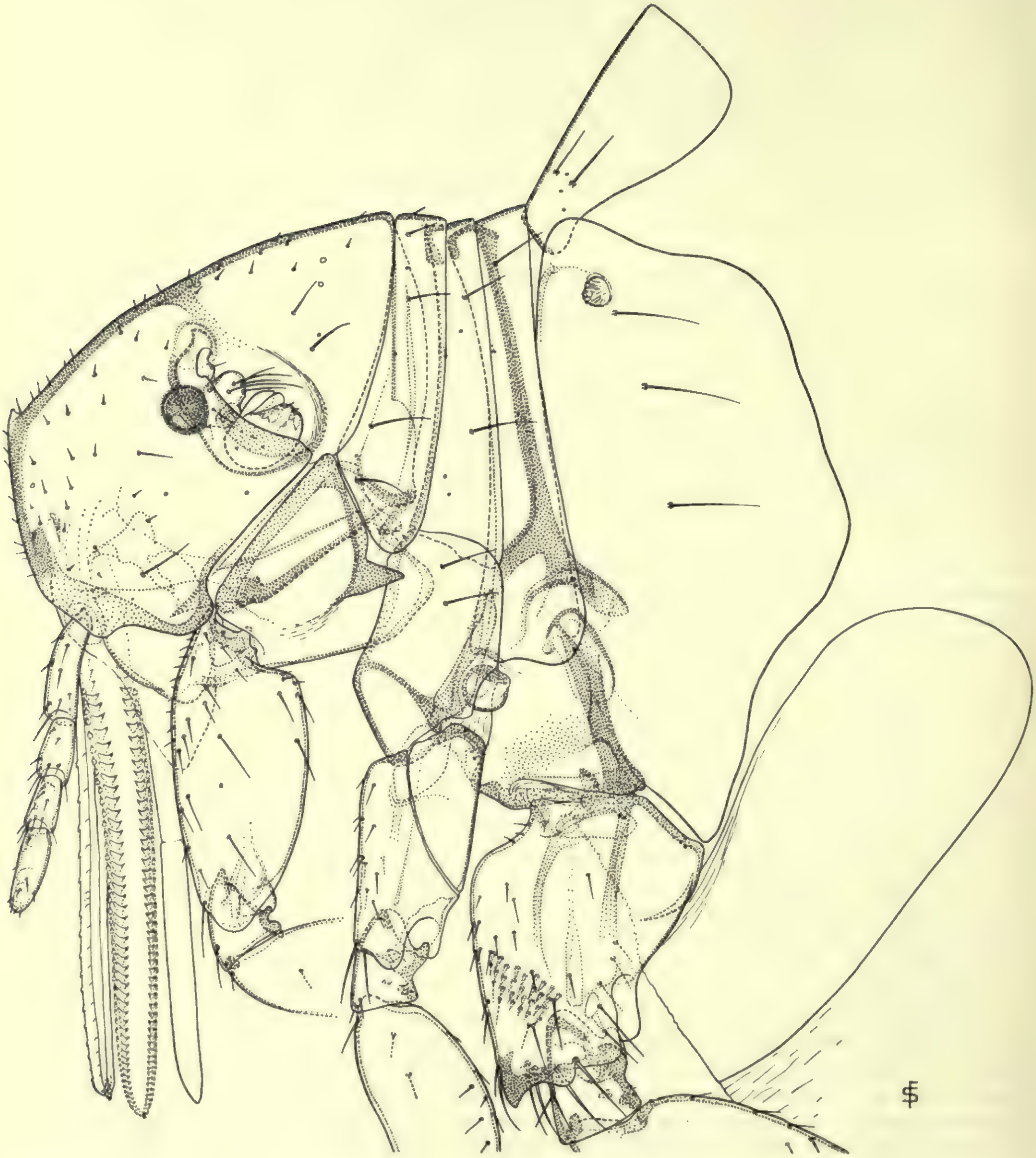
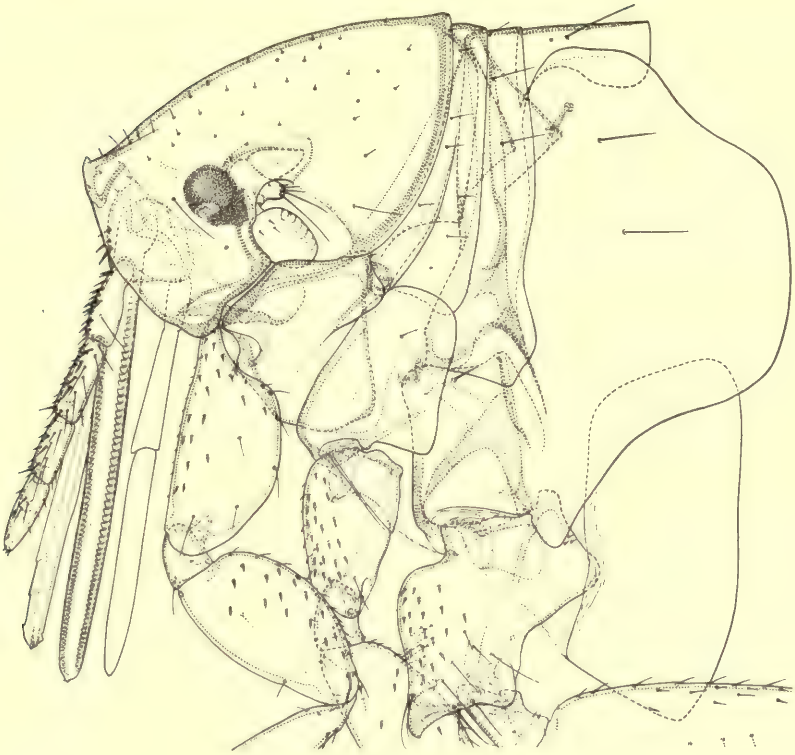
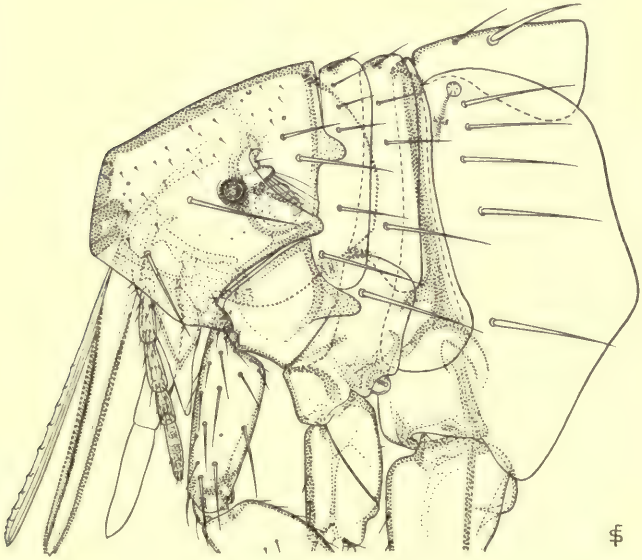
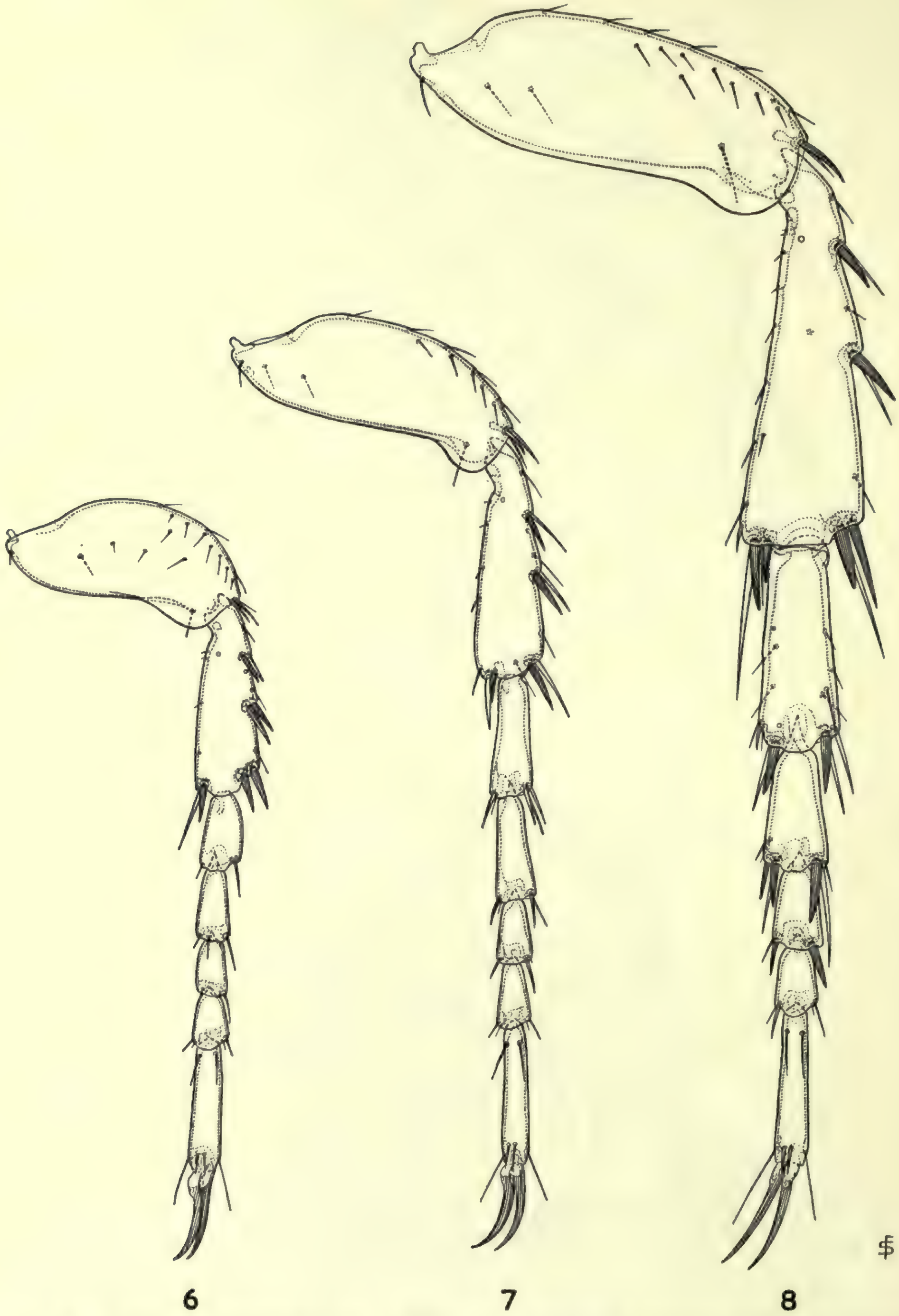


FIG. 3. *Neotunga euloidea* sp. nov. Head, thorax, basal segments of legs, tergum I and sternum II of holotype.





FIGS. 4–5. Anterior part of females of: 4. *Tunga penetrans* (L.), 5. *Echidnophaga gallinacea* (Westwood).



FIGS. 6–8. *Neotunga euloidea* sp. nov. 6. Fore leg. 7. Mid leg. 8. Hind leg (all of paratypes).

Abdomen (Text-figs. 2, 9–12, 15, 16). Terga I–VII each with a row of two medium-sized setae per side. Spiracular fossae of terga II–VII circular and large, increasing in size from tergum II onwards (the spiracular fossa on the metepimeron is somewhat larger than that of tergum II). Posterior margin of tergum VII dorsally sinuate. Sterna II–VI without setae, sternum VII with two setae near the ventral margin. Tergum VIII with about half a dozen setae on the ventral half and on the inner side with seven or eight strong and straight setae which are placed on a thickening of the wall of the sclerite ; no setae above the large and broad spiracular fossa. Lower half of posterior margin of tergum VIII with a small fold. Sternum VIII short and broad, without setae. Sensilium with eight trichobothria each side. Anal tergum with some stout dorsoapical setae below which a number of slender ones. Anal stylet nearly twice as long as broad in the middle with a long apical seta, two preapical ventral setae and two microsetae. Anal sternum short, with about half a dozen slender setae per side.

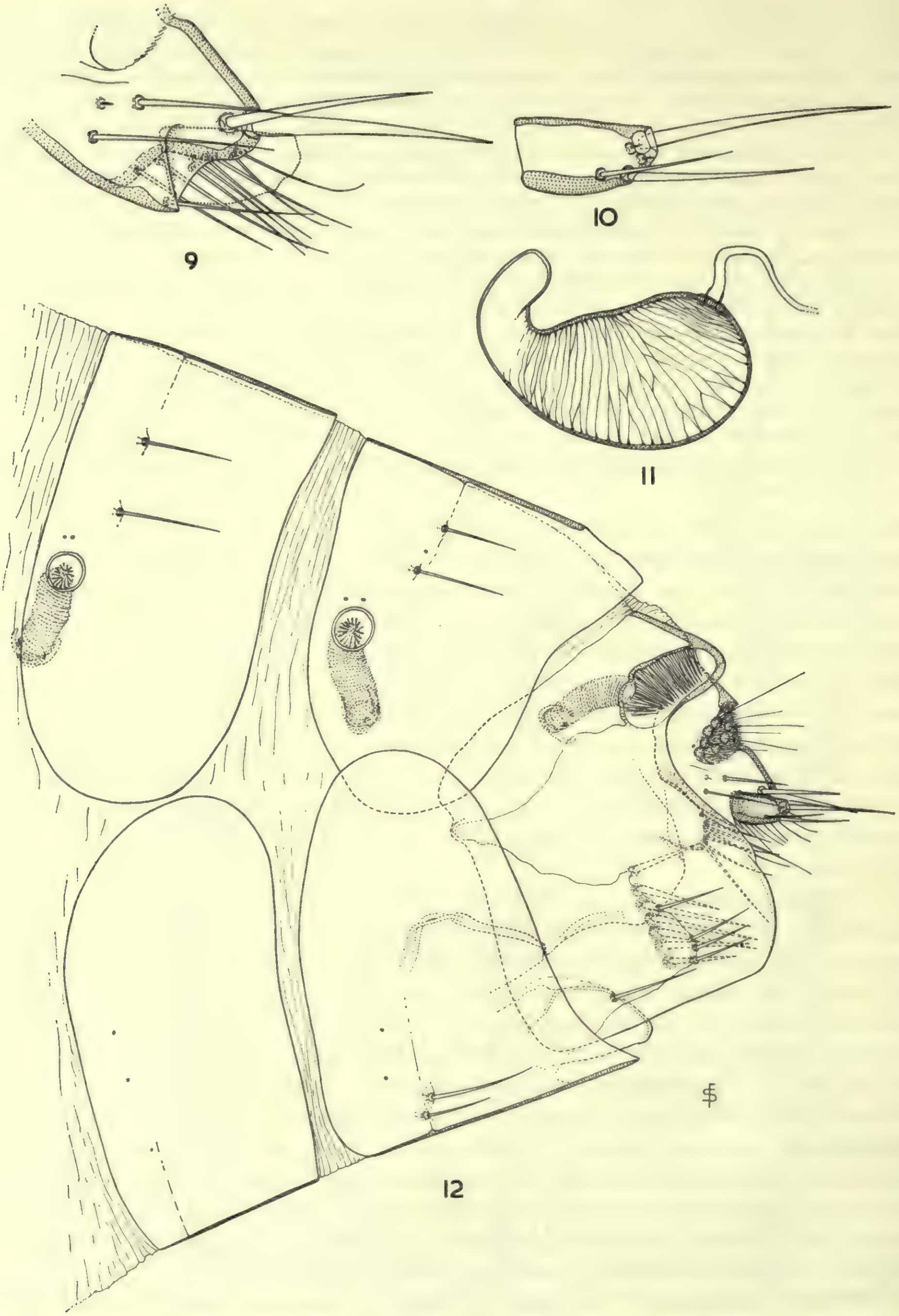
Bursa copulatrix a simple elongate tube ; ductus obturatus present. Spermatheca with a rather thinly walled pyriform bulga, which is internally rather coarsely striated, and a rather short and narrow hilla ; orifice of spermatheca dorsal. As in other fleas the spermatheca is situated in the right hand side of the abdomen.

Length : Distended females measure from 4 to 7 mm. in length, while the diameter of the abdomen is about 2 mm.; undistended females may be about 1·5 mm. long. Eggs are 0·7–0·8 mm. long, 0·35–0·4 mm. broad.

Embedded females of *Neotunga euloidea* were found in the soft skin, which is almost completely hairless, on all ventral regions of the pangolin *Manis temmincki* ; in the pangolin from the Sinoia district there were slight perianal and inguinal concentrations but no such concentrations were observed in the specimen from Que Que. There is a tendency for the nodules containing the engorged fleas to be near the lateral margin of the venter at the edge of the scales ; the fleas are not found under the scales. The nodules are not orientated in any particular way and in one instance there were two engorged fleas exactly alongside each other, facing the same direction. Unlike the females of *Tunga*, the embedded flea lies with its elongate body parallel with the skin's surface (Text-fig. 1). Dr. Weir informs me that nodules are often difficult to see and can best be found by examining the skin for lumps, using gentle finger pressure.

The degree of infestation was rather slight in the pangolins examined : 6, 11 and 12 fleas per host individual. Whether heavier infestations occur in nature remains to be discovered. It is interesting to note that the pangolin which was kept alive for two years was, on its death, found to be infested with 11 specimens of *Neotunga euloidea*. This might imply that the flea had been breeding in the cage where the pangolin was kept, for it seems unlikely that these fleas would remain alive and produce eggs for over two years. The pangolin from Que Que showed on the venter a small region of scar tissue with indications of former nodules. As considerable quantities of eggs are produced—the average number of ripe eggs in three specimens was 30—it seems strange that the captive pangolin was not more heavily infested, but the conditions under which it was kept may not have been wholly favourable for the development of the larvae. To keep an infested pangolin in a flea-proof cage would seem the ideal method of eventually obtaining male and unengorged female fleas.

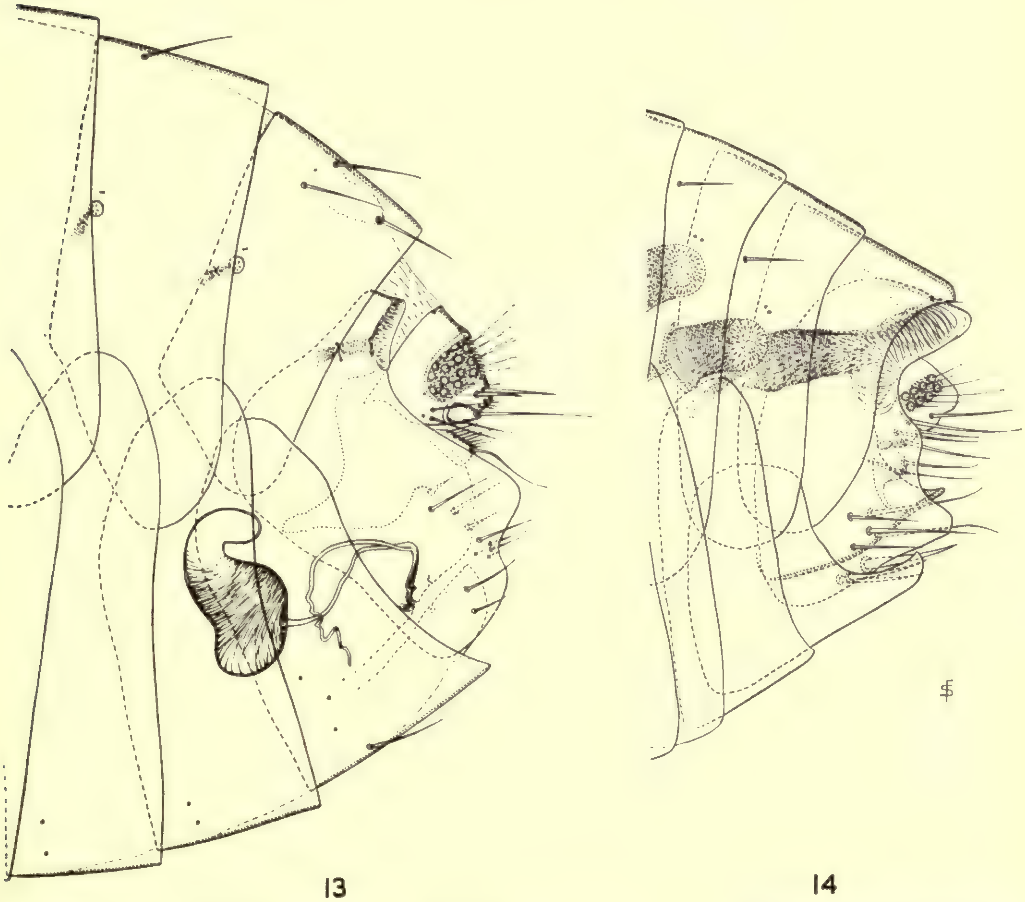
Dr. Weir informed me of two negative records : one adult female *Manis temmincki* collected in December, 1959, in the Melsetter District of Southern Rhodesia (near the border of Mozambique), and one female collected on 19.xi.1960 between Salisbury and Norton.



FIGS. 9–12. *Neotunga euloidea* sp. nov. (paratypes). 9. Anal tergum (stylet in dotted outline). 10. Anal stylet. 11. Spermatheca. 12. Terminal abdominal segments (*i.e.* segments VI–X).

Nearly all fleas were cut out with surrounding skin and flesh and preserved in alcohol. After two or three hours in 10% solution of potassium hydroxide the embedded fleas could be easily removed, with the aid of two minute mounted needles, from the macerated flesh around them, but one has to break the opaque thin silvery "skin" which fits tightly over part of the abdomen.

An astonishing observation was made by Dr. Weir who found that "in some cases the flea seemed to be hanging free from the skin and was only attached by its head." Indeed, among specimens sent by Dr. Weir are a few without surrounding skin or flesh and without the silvery "skin" which is so characteristic of embedded specimens. Such specimens, which had no need to be treated with potash in order to free them, have been used for the photographs reproduced on Pl. 1. Mechanically it would seem to be impossible for an engorged specimen to penetrate the skin of the host. It

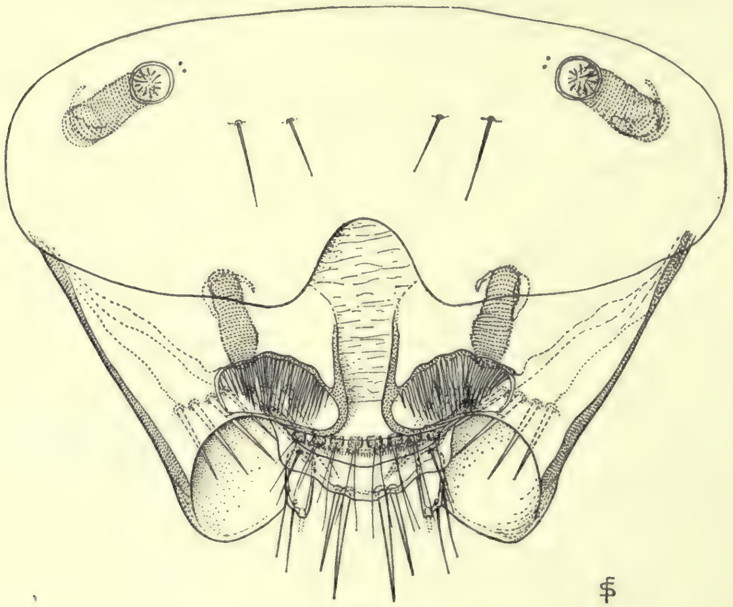


13

14

FIGS. 13–14. Terminal abdominal segments of females of: 13. *Echidnophaga gallinacea* (Westwood). 14. *Tunga penetrans* (L.).

is more likely that these extracutaneous specimens failed to enter the skin and remained attached to it by the strongly developed mouthparts, as for example do females of *Echidnophaga*. If this is indeed the case it is interesting to note that these extracutaneous specimens become engorged to the same extent as embedded ones. This would indicate that engorgement is not correlated with embedding. The opposite appears to be the case in *Tunga*, for Geigy (1953 : 41) found that freshly emerged females of *Tunga penetrans*, when removed from the skin after feeding, without giving them a chance to burrow, soon perished without having shown the slightest indications of hypertrophy.



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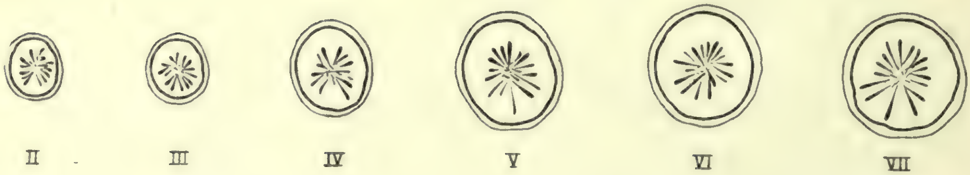

16

FIGS. 15–16. *Neotunga euloidea* sp. nov. (Paratypes) 15. Dorsal view of segments VII–X. 16. Spiracular fossae of terga II–VII.

It would seem a considerable disadvantage to the flea not to be able to enter the skin of the pangolin's venter, for the chance may be great that the relatively large and heavy flea, hanging down, will be brushed off since the pangolin has short legs and the venter may sometimes touch the ground. Moreover, the fact that pangolins roll themselves up in a tight spiral when at rest may explain why most of the embedded fleas are found on the sides of the venter, close to the scales, for these sites will very likely be the easiest for the fleas to reach and there they will presumably be least liable to squashing.

Geigy (1953) and Geigy & Suter (1960) have shown that extracutaneous as well as intracutaneous fleas (*Echidnophaga gallinacea* and *Tunga penetrans* respectively were used for their observations) copulate after the female has fixed herself to the host. During and after copulation the female of *Echidnophaga* remains attached to the host by the proboscis, and in the case of *Tunga* the females are embedded in the skin. Since *Neotunga euloidea* is an Echidnophagoid flea with the habits of a Tungoid, one may surmise that here too copulation will take place after the female has entered the skin. The female lying in a plane parallel with that of the surface of the skin, contact between male and female *Neotunga* can presumably be closer than that between the two sexes of *Tunga* and less close than between those of *Echidnophaga*, and the aedeagus of *Neotunga* might therefore be expected to be of a structure intermediate between that of *Echidnophaga* and *Tunga*.

Of special interest are the size and structure of the abdominal spiracular fossae (Text-fig. 16). The metepimeral spiracular fossa is somewhat larger than those of terga II and III which are of subequal size, while that of tergum IV is intermediate between those two and the large ones of terga V–VII. As Jordan has shown (see p. 363 above), in the female *Echidnophaga* the abdominal spiracular fossae are of subequal size and somewhat smaller than the metepimeral fossa, while in female *Tunga* the fossae of terga II–IV are much smaller than the metepimeral one and have actually vanished in *T. penetrans*; however, in this latter genus the fossae of terga V–VIII are greatly enlarged. Jordan postulated the existence of a Tungoid flea in which the anterior abdominal fossae would approach the size of the metepimeral fossa but with those of terga V–VIII enlarged. As can be seen from Text-fig. 16, this is exactly the case in *Neotunga euloidea*. It is tempting to suppose that the differentiation in size of abdominal spiracular fossae in this species followed the apparently fairly recently acquired Tungoid habit of the female to burrow under the skin of the host and is one of several morphological modifications in a basically Echidnophagoid structure pointing towards the great morphological adaptations to be observed in *Tunga*.

In embedded females of *Tunga* the abdominal organs undergo radical changes during the period of hypertrophy. In the hypertrophic females of *Neotunga* similar changes must have taken place, since I found for example the tracheae greatly enlarged and very numerous and of the same structure as in *Tunga*; the midgut, although very long and wide (see Text-fig. 2, in dotted outline), retains its straight shape instead of attaining an S-shape or double S-shape as is the case in *Tunga*, but the relative narrowness of the abdomen in *Neotunga* does not allow a folding of the midgut.

SYSTEMATIC POSITION OF GENUS NEOTUNGA

As has been remarked above, *Neotunga euloidea* is basically an Echinophagoid flea with Tungoid habits. The genus *Neotunga* has in the female sex the following more important characters in common with *Echidnophaga* :

Head (Text-fig. 3, *cf.* Text-fig. 5) :

(*a*) frontal margin below the tubercle long ;

(*b*) genal seta present, though much reduced ;

(*c*) antennal scape and pedicel not set at right angles to the clava ;

(*d*) first two claval segments not fused with each other nor with the rest of the clava ;

(*e*) an indication of an internal supra-antennal ridge ;

(*f*) epipharynx with numerous small projections along anterior margin.

Thorax (Text-fig. 3, *cf.* Text-fig. 5) :

(*g*) prosternosome dorsally tapering to a point which is situated opposite to the apex of the antennal clava ;

(*h*) prosternosome with a well-developed lateral triangular flange ;

(*i*) mesosternal furca long and narrow.

Legs (Text-fig. 3) :

(*j*) hind coxa with a patch of small spiniform setae on the lower part of the inner side.

Abdomen (Text-fig. 12, *cf.* Text-fig. 13) :

(*k*) tergum VIII without a seta above the spiracular fossa ;

(*l*) anal tergum with a pair of well-developed anal stylets.

The following features of female *Neotunga* are characteristic of members of *Tunga*:

Head (Text-fig. 3, *cf.* Text-fig. 4) :

(*a*) frontal tubercle pointing upward (in some members of *Echinophaga* a frontal tubercle may be present, but then it is not so well developed as in *N. euloidea*) ;

(*b*) microsetae of head pointing upwards ;

(*c*) eye somewhat sinuous internally (in some specimens) ;

(*d*) claval segments of antenna fused, apart from first two segments ;

(*e*) genal lobe much reduced.

Legs (Text-figs. 6–8) :

(*f*) tibiae with only two lateral notches bearing stout setae.

Abdomen (Text-fig. 12, *cf.* Text-fig. 14) :

(*g*) spiracular fossae, and their tracheae, of terga V–VIII much enlarged (although smaller than those in *Tunga*) ;

(*h*) antesensilial setae absent ;

(*i*) genital setae on inner side of tergum VIII much enlarged ;

(*j*) sensilium with eight trichobothria each side.

General :

(*k*) chaetotaxy much reduced.

In other structural characteristics the genera *Tunga, Neotunga* and *Echidnophaga* are much alike, for example all have a strong hook-like tooth at the ventro-anterior angle of the hind coxa which is absent in all other fleas (there is a small tooth in *Delopsylla* but this monotypic genus is very closely akin to *Echidnophaga*).

On the whole the head and thorax and their appendages show a greater affinity to those of *Echidnophaga* than to those of *Tunga*, but the abdomen resembles that of the latter genus more than that of the former. However, the abdominal modifications are a result of adaptation to an ecological niche which is shared only by *Tunga* and they need not necessarily indicate a close phylogenetic relationship. In a system of classification *Neotunga* should be placed somewhere between *Echidnophaga* and *Tunga*, but nearer to the former than to the latter genus.

It is possible that *Neotunga* represents an early step in the evolution from an Echidnophagoid ancestor to a form resembling *Tunga*, and that the ancestors of the extant species of *Tunga* have passed through a stage similar to that exhibited by *Neotunga*.

To put *Echidnophaga* in the same supra-generic group as *Tunga* might seem far-fetched as recent classifications have included these genera in two different subfamilies or even families. However, it should be noted that relationships between groups of species tend to be obscured when members of a certain group take to an ecological niche or a mode of life which is very different from that occupied by members of related groups, and as a result undergo more or less profound morphological changes. Thus the intromittent organ of species of *Tunga* is highly specialized and superficially unlike that of any other flea, but in no other flea is the mode of copulation so extremely unusual. It follows that the genitalia may not be a reliable guide to phylogenetic relationships of fleas which have exchanged the normal ectoparasitic way of life for an endoparasitic one.

The discovery of the male of *Neotunga euloidea* will very likely enable us eventually to assess the true relationships of *Neotunga*, but in compliance with General Recommendation No. 6 of the International Code of Zoological Nomenclature I *tentatively* place this genus, along with *Echidnophaga* and *Delopsylla*, in the Family Pulicidae.

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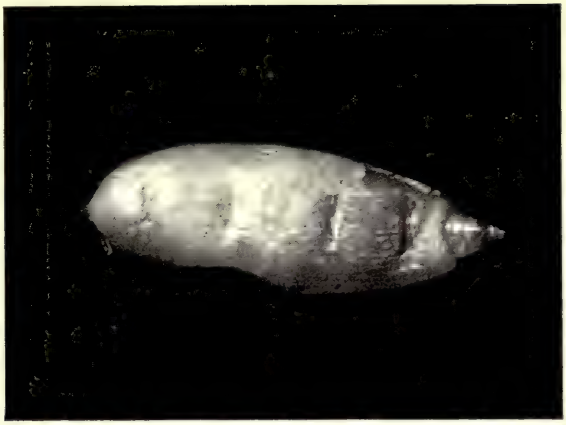
PLATE I

Neotunga euloidea sp. nov. A. Dorsal view. B. Lateral view. C. Ventral view. (Paratypes).

A.



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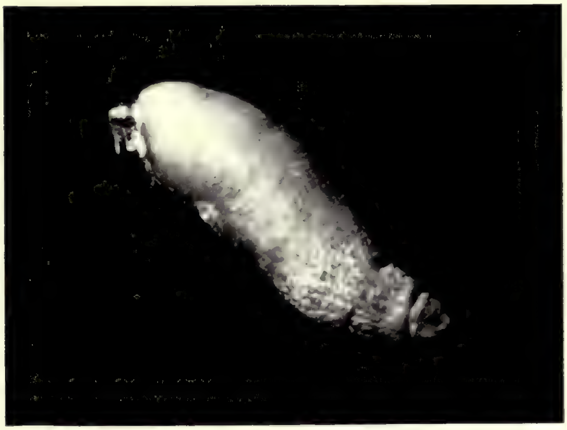
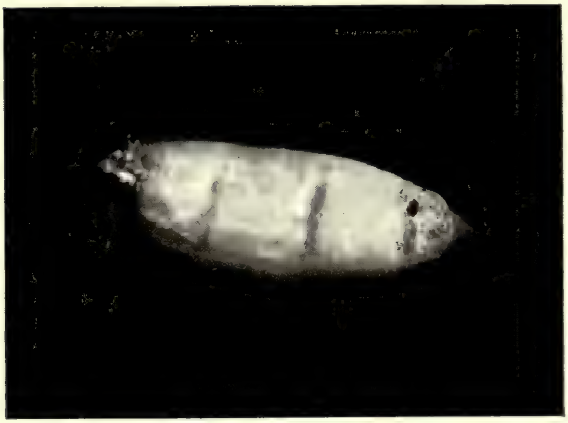


C.



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HOLARCTIC SAWFLIES (HYMENOPTERA: SYMPHYTA)

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30 OCT
NATURAL HISTORY

ROBERT B. BENSON

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BY

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HOLARCTIC SAWFLIES (HYMENOPTERA: SYMPHYTA)

By ROBERT B. BENSON

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SYNOPSIS

A comparative study of the boreal sawflies of the old and new worlds reveals that 134 species can now be recorded from both : 34 of these are additions to the N. American fauna ; and 33 more were previously treated as different species in the two worlds. Furthermore 30 are presumed to have been introduced into N. America from Europe and 1 into Europe from N. America. These holarctic species show several different biogeographical patterns.

1. INTRODUCTION

In 1956 a Leverhulme Research Fellowship enabled me to spend five months in North America. One of my objects was to correlate the boreal and arctic sawflies of North America with those of Eurasia.

My grateful thanks are due to Mr. G. P. Holland, Head of the Section on Insect Taxonomy, of the Entomological Research Institute, Ottawa, for allowing me access to the named collections there, including the types, and to the unworked material. This latter consisted mainly of the rich collections brought back by the Institute's staff since 1947 from many parts of the North American Arctic in the course of their Northern Insect Survey (Freeman, 1952).

Mr. Holland also kindly arranged for me to stay at the Defence Research Northern Laboratory, Fort Churchill, Manitoba, on the west coast of Hudson Bay at about 58° 44′ N. lat. for three weeks in June and July. There I was able to make collections at the edge of the tundra to compare with similar material I had already collected at Abisko in Swedish Lapland in 1948 and 1954. Apart from this material, which is in the British Museum, the North American material dealt with in this paper is deposited (unless otherwise stated) in the Entomology Research Institute, Ottawa, Canada. I am also indebted to Dr. J. Gates Clarke for letting me examine the types of Kincaid, Marlatt and Rohwer in the U.S. National Museum, Washington, Dr. Herbert H. Ross the types of MacGillivray at Urbana, Illinois, Dr. René Malaise (Stockholm) for freely letting me borrow types and other specimens from his own Lapland and Kamtchatka collections, and Mr. E. Lindqvist (Helsingfors) for many loans and gifts of representatives of species he has described from North Europe. The Greenland material referred to is at Copenhagen and was kindly lent to me by Dr. Børge Petersen in 1959.

2. BIOGEOGRAPHICAL TERMS

Owing to the lack of agreement as to how different biogeographical terms should be applied it is necessary to define how I am using them here.

Holarctic: occurring in at least some part of both nearctic and palaearctic regions.

Arctic : associated with tundra beyond or above the tree-line.

Alpine : similar to the arctic type of fauna, but above the tree-line on mountains distant from regions of northern arctic tundra.

Montane : other types of mountain fauna above the tree-line.

Subarctic : associated with the boreal coniferous forest belt (taiga).

Subalpine : associated with subalpine coniferous forest belt.

Circumpolar : occurring in arctic tundra not only on the mainland of Fennoscandia but also eastwards across Siberia and the Bering Straits to East Canada.

Circumboreal : as the preceding (circumpolar) but associated not with tundra but mainly with the boreal forest belts.

The above terms have been applied only in the most general way as the distribution of arctic and subarctic sawflies is still very little known. In some species almost the only information available is from my own collecting in Lapland, Scotland, Switzerland and Canada. It is not therefore reasonable to apply such refinements of distributional classification as has been applied for example to the flowering plants by Hultén (1950) or Porsild (1951).

3. DISTRIBUTION PATTERNS OF HOLARCTIC SAWFLIES

(a) *Circumpolar species*

Species with holarctic distributions are diverse ecologically, but arctic species predominate and many of them are circumpolar. Benson (1961) found no less than 14 circumpolar sawflies in high alpine regions of Switzerland and this number included such high arctic species as *Amauronematus abnormis* and *A. arcticola*. Freeman (1958) estimated that 60 per cent of the Canadian arctic butterflies are holarctic in distribution and similar percentages have been estimated for many other insect groups. A specimen of *Pachynematus parvilabris* was collected from Ward Hunt Island off the north coast of Ellesmere Island, Lat. 83° 05′ N. and Long. 74° 30′ W. (less than 500 miles from the North Pole). This is even further north than Brønland Fjord, off Independence Fjord, North Greenland, about Lat. 82° N. and Long. 31° W., where *Amauronematus amentorum* (in Copenhagen Mus.) was found.

(b) *Circumboreal species*

These are of various types. *Rhogogaster viridis* for example shows no subspeciation throughout its range, but *Pachyprotasis rapae* occurs in a slightly different form in

North America than in Eurasia though the two forms are assumed to be interfertile and conspecific. Other examples are *Arge clavicornis* and *Monophadnoides geniculatus*, in both of which brown-bodied forms occur sporadically as part of N. American though never in Eurasian populations. This increase in brown or red in North American races of holarctic species also occurs in *Loderus*, *Dolerus* and *Tenthredo*.

Another kind of circumboreal distribution is shown by *Xyela alpigena*. This species is subalpine in Europe, associated with *Pinus cembra*. It has also been found in East Siberia and Japan where the same *Pinus* occurs, and presumably the *Xyela* is spread along the intervening mountains in Central Asia on the same host. In eastern North America it is associated with the closely related *P. strobus*. *X. obscura* has a similar distribution.

(c) *Incomplete holarctic distributions*

Many holarctic species are not completely circumpolar or circumboreal. The range of some transcontinental Eurasian species such as *Heptamelus ochroleuchus*, *Dolerus gessneri*, *Tenthredo devia* or *Amauronematus pravus* crosses the Bering Straits but reaches no further than the Pacific coastal regions of North America. Conversely some transcontinental North American species occur in East Asia but do not extend beyond the Pacific coastal region : *Amauronematus hulteni* for example reaches Kamtchatka and *Dolerus subfasciatus* Japan. Some forms such as *D. gessneri konowi* are restricted to the Pacific region of the two continents.

(d) *Introduced species*

It would seem that several species are holarctic now only because they were introduced accidentally by man. The species marked with an asterisk in the general account below are thought, for one or more of the following reasons, to have been introduced from Europe to America or, in one instance, from America to Europe : (i) that though widespread in Europe or Eurasia as a whole their distribution in North America is discontinuous ; they occur only sporadically in the more densely populated parts (*Macrophya punctum-album* and *Eriocampa ovata*) ; (ii) that their discovery in North America has been only recent and they have occurred suddenly in epidemic numbers (*Gilpinia hercyniae* on *Picea*, *G. frutetorum* and *Diprion similis* on *Pinus*, *Heterarthrus nemoratus*, *Profenusa thomsoni* and three other Fenusine leaf-miners in shade trees, *Dolerus nitens* and *Aneugmenus padi*) ; (iii) that they are attached to plants that have frequently been imported into North America or are not native there (*Ardis sulcata* on *Rosa*, *Pontania proxima* on *Salix fragilis*, *Hoplocampa testudinea* on *Malus pumila*, *Pristiphora abbreviata* on *Pyrus communis*, etc.) or to a plant introduced from North America to Britain (*Nematus tibialis* on *Robinia pseudacacia*).

It is significant that all except three of the examples of introduced species mentioned above are obligatory parthenogenetic species, at least in the countries where they have become established by introduction.

In some of them (e.g. *Gilpinia hercyniae*, and *Dolerus nitens*) the existence of obligatory parthenogenetic races in Europe was not even suspected until the discovery of their introduction into North America was made known.

It would seem that, other factors being equal, obligatory parthenogenetic races have a far greater chance of establishing themselves on introduction, as a single individual could give rise to a colony ; but it would also seem that such a colony might suffer in its inability to adapt itself to new conditions through lacking the interplay of selection in the recombinations of genes. (Benson, 1950 : 124–8.)

That nearly all the British Fenusini leaf-mining forest and shade trees have become established in North America may have been through the use of forest litter in packing goods.

Some of the introduced species are not associated with plants likely to have been imported whole and were probably not conveyed in litter used for packing. Species such as *Dolerus asper*, *D. nitens* and *Pachynematus clitellatus* were probably introduced into North America in ballast through the Atlantic ports. Their larvae feed on Gramineae and Cyperaceae, and they occur in just such open places on the coast as those from which the ballast was shipped from England (Lindroth, 1957).

4. NOTE ON REFERENCES AND SYMBOLS

References to species already given in Dalla Torre, 1894, Konow, 1905, the North American Catalogue of Muesebeck, Krombein & Townes, 1951, or its first supplement by Krombein, 1958, are not repeated here. It is assumed that most of the Central European species can be identified with the help of Enslin (1912–18), or Benson (1952–58) ; exact references to these works are not given unless there is a special reason such as the existence of a figure of the saw or penis valve in Benson's work. The species marked ‡ are additions to the list of North American species and those marked † were previously known as N. American but not as holarctic and usually by a different name. Species marked with an asterisk are assumed to be holarctic only through introduction from Europe or Asia to N. America, or in one instance (*Nematus tibialis*) from N. America to Europe. Species marked ♀ are obligatorily parthenogenetic, normally without functional males, in the races that are holarctic.

5. LIST OF HOLARCTIC SPECIES

Arctic and boreal sawfly species are often more variable in colour and form than those of more temperate regions, and have more abnormalities. For this reason some of the more common species such as *Amauronematus fallax*, *A. polaris*, *Nematus reticulatus* and *Pontania crassipes* have been treated by previous authors as though they were groups of species and have been divided accordingly ; and some of the more aberrant specimens have even been described as distinct species on the basis of single examples. As a result of this a false picture of the Nematinae of boreal and arctic Europe has been presented, heading towards chaos. So I have found it is necessary to treat all such European species that are based on single specimens as *species inquirendae* until more specimens can be found or their probable identity determined.

Furthermore, if for biological or other reasons it is known that two similar forms belong to separate species, it may be necessary to use characters for distinguishing them that are extremely difficult to appreciate. But the reverse of this is not true : discrete morphological differences often occur between individuals of the same interbreeding populations and their discovery is no proof that more than one species is involved.

XYELIDAE

† *Xyela alpigena* (Strobl)

Pinicola alpigena Strobl, 1895 : 277.
Xyela brunneiceps Rohwer, **syn. n.**
Xyela kamtshatica Gussakovskij, 1935 : 363.
Xyela alpigena (Strobl) ; Benson, 1938 : 35 and fig. 4.
Xyela middlekauffi Burdick, 1961 : 343 and figs. 39 and 55.

Dr. Burdick, to whom I sent Swiss specimens of *X. alpigena* in exchange for paratypes of *X. middlekauffi*, agrees that the two are synonymous and therefore that *X. brunneiceps* is also. In Europe this species is subalpine with its host *Pinus cembra* L., and occurs presumably on the same plant across Asia to Japan. In eastern N. America Burdick gives the hostplant as the closely related *P. strobus* L.

† *Xyela obscura* (Strobl)

Pinicola julii var. *obscura* Strobl.
Xyela japonica Rohwer, 1910 : 99.
Xyela obscura (Strobl) ; Benson, 1960 (*c*) : 110–111, figs. 2 and 3.
Xyela pini Rohwer ; Burdick, 1961 : 327, figs. 45 and 62.

This species, like *X. alpigena*, is also subalpine in Europe and extends eastwards to Japan and N. America. In Europe it is attached to *Pinus mugo* Terra, but in N. America it is known from *Pinus banksiana* Lamb, *P. palustris* Mill., *P. ponderosa* Laws. and *P. virginiana* Mill. The synonymy of *X. pini* with *X. obscura* was suggested to me by Dr. Burdick.

PAMPHILIIDAE

* *Acantholyda erythrocephala* (L.)

Europe and North Asia to Japan, introduced into North America.
Pinus.

SIRICIDAE

Sirex cyaneus Fabricius

Circumboreal species. *Sirex varipes* Walker is *not* a synonym of this species (Benson, 1943).
Coniferae.

†* *Sirex noctilio* Fabricius

Sirex noctilio Fabricius ; Benson, 1943 : 37 and fig. 1*a*.

Europe, North Asia and Manitoba (? introduced).
Coniferae.

†* *Sirex juvencus* L.

Sirex juvencus L.; Benson, 1943 : 37 and fig. 1*b*.

Europe, North Asia, also Labrador and Newfoundland (? introduced).
Coniferae.

† *Urocerus gigas flavicornis* (Fabricius)

Urocerus gigas flavicornis (Fabricius); Benson, 1943 : 39.

North American subspecies of Eurasian species.
Coniferae.

Xeris spectrum (L.)

Circumboreal species.
Coniferae.

CEPHIDAE

**Cephus pygmaeus* (L.)

Europe, Asia Minor, Caucasus to Turkestan, introduced into North America.
Gramineae especially cultivated wheat, barley and rye.

* *Trachelus tabidus* (Fabricius)

Europe, North Africa, Asia Minor, Caucasus and south-west Asia, introduced into North America.
Gramineae especially cultivated wheat and rye.

DIPRIONIDAE

* *Neodiprion sertifer* (Geoffroy)

North and Central Europe to Caucasus, Corea and Japan. Introduced into north-east America, westwards to Ohio.
Pinus.

* *Diprion similis* (Hartig)

North and Central Europe. Introduced into north-east America.
Pinus.

* *Gilpinia frutetorum* (Fabricius)

North and Central Europe. Introduced into north-east America.
Pinus.

* *Gilpinia hercyniae* (Hartig) ♀

North and Central Europe. Introduced into East Canada.
Picea

ARGIDAE

* *Arge ochropus* (Gmelin)

Europe, West and Central Siberia, Asia Minor, North Persia, Caucasus and Transcaspia, introduced into Ontario.

Rosa.

† *Arge clavicornis* (Fabricius)

A. fuscipes (Fallén) **syn. n.**

The North American form is extremely variable in colour and may have its abdomen entirely metallic blue, more or less marked with yellow or almost entirely yellow. The European forms are *A. clavicornis expansa* (Klug) **comb. n.** of subarctic-subalpine regions (Benson, 1951 : 34) and *A. clavicornis fuscipes* (Fallén) **comb. n.** of temperate parts of Central and Western Europe and are without yellow markings.

TENTHREDINIDAE

Selandriinae

Selandriini

Brachythops flavens (Klug)

Selandridea vanduzeei Rohwer, 1911, **syn. n.**

Circumboreal.

Carex.

‡ *Brachythops wüstnei* (Konow)

Central and Northern Europe. Canada, Manitoba, Churchill, 5 ♂, 12–13.vi.1952 (*J. G. Chillcott*). 1 ♂ 29.vi.1956 (*R. B. Benson*).

? Circumboreal.

Carex.

Aneugmenini

* *Aneugmenus padi* (L.), ♀

Selandria urbis Ross.

Europe, North Africa, Asia Minor and Transcaucasia, introduced and widespread in Canada.

Pteridophyta.

Heptamelini

‡ *Heptamelus ochroleucus* (Stephens)

North Eurasia and British Columbia, Squamish, Diamond Head Trail, 3,300 ft., 1 ♀, 5.viii.1953 (*Edith Mason*) (Ottawa).

Pteridophyta.

Dolerini

Loderus eversmanni (Kirby)

Represented by subsp. *acidus* MacGillivray in North America, by subsp. *obscurus* Marlatt in Japan, and typical subspecies in Europe.

Circumboreal.

Equisetum.

Loderus pratorum (Fallén)

Represented by subsp. *albifrons* Norton in North America and East Asia, and typical subspecies in Europe.

Circumboreal.

Equisetum.

Loderus vestigialis (Klug)

Represented by subsp. *apricus* Norton in North America, subsp. *insulicula* Rohwer in Japan, and typical subspecies in Europe.

Circumboreal.

Equisetum.

Loderus genucinctus (Zaddach)

Represented by subsp. *napaeus* MacGillivray in North America and typical subspecies in Europe.

Circumboreal.

Equisetum.

Dolerus yukonensis Norton

Full synonymy in Benson, 1956 : 58.

Circumboreal.

Equisetum.

Dolerus gessneri André

Represented by subsp. *konowi* MacGillivray in Pacific North America and Siberia, subsp. *labiosus* Konow in North Europe and Siberia, and the typical subsp. in Western Europe.

Full synonymy in Benson, 1956 : 59.

Equisetum.

Dolerus subfasciatus Smith

Dolerus picinus rhodogaster Zhelochovtsev 1935 : 79, **syn. n.**
Dolerus pseudoanticus Malaise 1931 : 14–15, **syn. n.**

This species is represented by subsp. *neoaprilis* MacGillivray in N. America and the typical subspecies in Japan.

Equisetum.

Dolerus pratensis (L.)

Dolerus frisoni Ross.

North and Central Europe to East Siberia. Alberta, Manitoba and Illinois in North America.

? Circumboreal.

Equisetum.

Dolerus elderi Kincaid

Circumboreal : North Europe to East Siberia and mountains of Central Asia from Mongolia to Turkestan, North America from Alaska and the Cordilleras to the Atlantic coast.

Equisetum.

Dolerus similis Norton

Transcontinental boreal North American with melanic races (subsp. *nicaeus* MacGillivray) in the Pacific area, extends into East Asia to Japan (subsp. *japonicus* Kirby with entirely black males, but normal red-banded females). This species is very closely similar to the widespread palaearctic *D. germanicus* (Fabricius) (Benson, 1952 : 67, 73–74, figs. 185 and 220) which, however, has a deeply excised clypeus in front. The two are nowhere sympatric as *D. germanicus* does not reach Japan, and they may be conspecific.

Equisetum.

† ***Dolerus asper*** Zaddach

Dolerus asper Zaddach ; Benson, 1952 : 70, 77, figs. 175, 194, 207, 210 and 235.
Dolerus tectus MacGillivray **syn. n.**

Europe to East Siberia and, in America, recorded from Connecticut, Massachusetts, Michigan and South Dakota.

Cyperaceae and Gramineae.

Dolerus nitens Zaddach, ♀

Dolerus wanda Ross ♀.
Dolerus nitens Zaddach ; Benson, 1952 : 70, 76, figs. 174, 196, 205, 209 and 237.

North and Central Europe, New York, Ohio and Illinois in North America. The American race is obligatorily parthenogenetic like the high-alpine Swiss race and may prove to represent a different species for which the name *wanda* is available.

Tenthredininae

Heterarthrini

* ***Heterarthrus nemoratus*** (Fallén)

Europe, introduced to Nova Scotia about 1908 and now spread over most of eastern North America.

Betula.

Empriini

* ***Monostegia abdominalis*** (Fabricius) ♀

Europe to Asia Minor, Caucasus and Siberia, also eastern North America where it was probably introduced.

Primulaceae (*Anagallis*, *Lysimachia* and *Glaux*).

‡ ***Empria candidata*** (Fallén)

Central and North Europe to East Siberia and across North Canada from Yukon to Quebec. Yukon, Dawson, 1 ♀, 28.vi.1949 (*W. W. Judd*) ; North West Territory, Mackenzie Delta, Reindeer Depot, 3 ♀, 28.vi.1948 (*J. R. Vockeroth*) ; Salmita Mines, 64° 06′ N., 111° 15′ W. 1 ♀, 4.vii.1953 (*J. G. Chillcott*) ; Alberta, Banff, 1 ♀, 25.v.1922 (*C. B. D. Garrett*) ; Manitoba, Gilan, 1 ♀, 18.vi.1950 (*W. J. Brown*) ; Quebec, Pt. Chimo, 1 ♀, 16.vi.1948 (*H. M. Smith*).

Betula.

Ametastegia equiseti (Fallén)

Circumboreal.

Polygonaceae (*Rumex* spp.), Chenopodiaceae (*Chenopodium*) and Lythraceae.

Ametastegia glabrata (Fallén)

Circumboreal.

Polygonaceae and Chenopodiaceae.

Ametastegia pallipes (Spinola) ♀

Circumboreal.

Viola.

Ametastegia tener (Fallén)

Circumboreal.

Rumex.

Allantini

Allantus cinctus (L.)

Circumboreal.

Rosa.

* ***Allantus basalis*** (Klug)

Europe and Siberia, introduced into eastern North America.

Rosa.

Blennocampini

* ***Ardis sulcata*** (Cameron)

Europe, introduced into Washington.

Rosa.

Monophadnoides geniculatus (Hartig)

Circumboreal.
Rubus.

* **_Halidamia affinis_** (Fallén) ♀

Europe, introduced into New York.
Galium aparine L. and *G. mollugo* L.

* **_Stethomostus fuliginosus_** (Schrank)

Europe to Caucasus and also Japan, introduced into eastern North America (Massachusetts and New York).
Ranunculus.

Eutomostethus ephippium (Panzer) ♀

Europe, North Africa, Asia Minor, Caucasus, Transcaucasia, Himalayas, Siberia and North America.
Gramineae.

Eutomostethus luteiventris (Klug) ♀

Europe, Transcaucasia and North America.
Juncus and Gramineae.

† **_Monophadnus pallescens_** (Gmelin)

Monophadnus aequalis MacGillivray **syn. n,**

Europe, Siberia and eastern North America.
Ranunculus.

Caliroini

* **_Endelomyia aethiops_** (Fabricius)

Europe to Caucasus, introduced into North America where it is now widespread.
Rosa.

* **_Caliroa cerasi_** (L.), ♀

Throughout temperate Eurasia, probably introduced into North America now established also in South America, South Africa, Tasmania and New Zealand.
Rosaceous trees, especially cultivated *Pyrus* and *Prunus.*

Fenusini

† **_Messa wüstnei_** (Konow)

Messa alaskana (Kincaid).
Messa wüstnei (Konow) ; Benson, 1959 : 90.

Boreal and arctic Eurasia and North America.
Salix.

†* **Profenusa thomsoni** (Konow), ♀

Profenusa alumna MacGillivray.
Profenusa thomsoni (Konow) ; Benson, 1959 : 91.

Temperate Europe and Japan, introduced into North America where it is now widespread.
Betula.

* **Fenusa dohrnii** (Tischbein), ♀

Eurasia and North America, introduced into South Africa.
Alnus.

* **F. pusilla** (Lepeletier)

Eurasia and North America whither it has probably been introduced.
Betula.

* **Kaliofenusa ulmi** (Sundewall), ♀

Europe, introduced into eastern North America.
Ulmus.

Eriocampini

* **Eriocampa ovata** (L.), ♀

Europe, introduced into British Columbia.
Alnus.

Tenthredinini

Rhogogaster viridis (L.)

Circumboreal.
Alnus, Betula etc.

Tenthredo olivacea Klug.

Boreal Eurasia and Alaska.

† **Tenthredo colon** Klug.

Tenthredo eburneifrons Kirby **syn. n.**
Tenthredo nigricollis Kirby **syn. n.**
Tenthredo jocosa Provancher **syn. n.**
Tenthredo livida L.; Ross in Muesebeck, Krombein & Townes. nec L.

Europe, Asia Minor, Armenia, Siberia ; and Ontario, Quebec and Labrador in North America.
Polyphagous.

† **Tenthredo atra** L.

It would seem that *T. leucostoma* Kirby of eastern North America and other forms in the same species-group are geographical races of *T. atra,* which is widespread in Eurasia from north-western Europe to East Siberia.
Circumboreal.

† ***Tenthredo devia*** (Konow)

Tenthredo heraclei Kincaid.
Tenthredo alaskana Enslin.
Tenthredo devia (Konow) ; Benson, 1959 : 94, 100 and fig. 8.

Lapland, North Russia, North Siberia to Kamtchatka and Japan, Aleutian Islands to Popof Island, Alaska.

Macrophyini

Pachyprotasis rapae (L.)

Europe to Caucasus, Siberia, North China and transcontinental Canada and north United States.

Antirrhinum, *Betonica*, *Scrophularia*, *Solidago* and *Fraxinus*.

* ***Macrophya punctumalbum*** (L.) ♀

Macrophya erythropa Schrank.

Europe to Caucasus, introduced into Ontario.

Fraxinus and *Ligustrum*.

Nematinae

Cladiini

Priophorus morio (Lepeletier)

Priophorus brullei Dahlbom ; Benson, 1958 : 142, figs. 352 and 358.

Circumboreal. Europe to Caucasus, Japan and North America, introduced into New Zealand and Tasmania.

Rubus.

Priophorus pallipes (Lepeletier)

Priophorus pallipes (Lepeletier) ; Benson, 1958 : 143, figs. 351, 359 and 360.

? Circumboreal. Europe to Caucasus and Transcaucasia, Siberia, Japan and North America.

Rosaceae (such as *Crataegus*, *Fragaria*, *Laurus*, *Prunus* and *Pyrus*) and also *Betula*.

* ***Trichiocampus viminalis*** (Fallén)

Trichiocampus viminalis (Fallén) ; Benson, 1958 : 143, fig. 355.

Europe and North Asia, introduced to both west and east coasts of North America.

Populus and sometimes *Salix*.

Cladius difformis (Panzer)

Circumboreal.

Rosaceae.

Nematini

* *Hoplocampa testudinea* (Klug)

Europe to Caucasus, introduced into Western Canada and New York.
Malus pumila Mill.

Hemichroa crocea (Geoffroy)

Circumboreal.
Alnus.

* *Pristiphora abbreviata* (Hartig) ♀

Pristiphora californica Marlatt.

Central and southern Europe, introduced into California.
Pyrus communis L.

* *Pristiphora geniculata* (Hartig)

Europe to Eastern Siberia, introduced into east of North America.
Sorbus.

Pristiphora pallipes Lepeletier ♀

Pristiphora rufipes Lepeletier.

Circumboreal.
Ribes rubrum L., *R. uva-crispa* L., etc.

Pristiphora quercus (Hartig)

Pristiphora idiota Norton.

Circumboreal.
Vaccinium and *Betula.*

‡ *Pristiphora staudingeri* (Ruthe)

Pristiphora staudingeri (Ruthe); Lindqvist, 1953 : 220–222, figs. 2 and 6; Benson 1958 : 167, figs. 461, 467.

Circumpolar: arctic-alpine in Europe, northern Siberia to Kamtchatka and Canada Manitoba, Churchill, vi.1956, (*R. B. B.*).
Salix.

‡ *Pristiphora leucostoma* (Lindqvist) comb. nov.

Lygaeophora leucostoma Lindqvist, 1952 : 108–109, figs. 42 and 61.

? Circumpolar.

I collected samples of this species in Swedish Lapland in 1954 and in Canada, Manitoba, Churchill, vi–vii.1956. It was also found in the North-west Territory, Mackenzie Delta, Reindeer Depot, 6.vii.1948 (*J. R. Vockeroth*).
Salix.

‡ ***Pristiphora reuteri*** (Lindqvist) **comb. nov.**

Lygaeophora arcticola (Enslin) ; Lindqvist, 1952 : 110–111, figs. 23, 44, and 62. nec Enslin.
Lygaeonematus (*Lygaeophora*) *reuteri* Lindqvist, 1960.

This arctic Eurasian species (N. Europe to Kamtchatka) is probably circumpolar as I found it in Canada, Manitoba, Churchill, vi–vii.1956 (*R. B. B.*).

Salix.

‡ ***Pristiphora pseudocoactula*** Lindqvist

Lygaeonematus pseudocoactulus Lindqvist, 1952 : 115, figs. 29 and 50.

Probably circumpolar : Canada, Manitoba, Churchill, 1♀, 3.vii.1956 (*R. B. B.*).

† ***Pristiphora coactula*** (Ruthe)

Pristiphora winnipeg (Norton). **syn. n.**
Lygaeotus coactulus (Ruthe) ; Lindqvist 1952 : 84–87, figs. 1, 31 and 52.

Vaccinium.

Circumpolar and arctic-alpine in Europe. This and the two following species are kept distinct with some diffidence. The slight differences in the genitalia given by Lindqvist are not reliable. The ranges are identical. They are probably forms of one species.

‡ ***Pristiphora borea*** (Konow)

Lygaeonematus boreus Konow, 1904 : 253.
Lygaeotus boreus (Konow) ; Lindqvist 1952 : 93–96, figs. 6, 33 and 54.
Pristiphora borea (Konow) ; Benson, 1958 : 171, figs. 459, 464 and 473.

Likewise circumpolar and arctic-alpine in Europe. In Canada, Manitoba, Churchill, it was common in June–July 1956 with the preceding and succeeding species. It was also found in North-west Territory, Mackenzie River, Reindeer Depot, 1948 (*J. R. Vockeroth*), Salmita Mines 64° 00′ N., 11° 15′ W., 1953 (*J. G. Chillcott*), and Padlei, 1950 (*R, A. Henniger*) ; Quebec at Bradore Bay, 1929 (*W. J. Brown*), and Great Whale River, 1949 (*J. R. Vockeroth*) ; and Labrador, Goss Bay, 1948 (*W. E. Becket*).

† ***Pristiphora lativentris*** (Thomson)

Pristiphora bucoda Kincaid.
Lygaeotus lativentris (Thomson) ; Lindqvist, 1952 : 88–90, figs. 2–4, 32 and 53.
Pristiphora lativentris (Thomson) ; Benson, 1958 : 169, figs. 465 and 472.

Likewise circumpolar and arctic-alpine in Europe. In Canada, Manitoba, Churchill, it occurred with the two preceding species in June–July 1956 and was also found in North-west Territory, Mackenzie River, Reindeer Depot, 1948 (*J. R. Vockeroth*).

Pristiphora mollis (Hartig)

Pristiphora mollis (Hartig) ; Benson, 1958 : 169, figs. 457, 462 and 468.

Circumboreal.

Vaccinium.

Pristiphora erichsonii (Hartig)

Circumboreal.
Larix.

Amauronematus amentorum (Förster)

Amauronematus suavis (Ruthe).
Pontopristia kamtchatica Malaise, 1931 : 53–54, fig. 24*a*.
Amauronematus amentorum (Förster) ; Benson, 1958 : 182, figs. 514, 515 and 533 ; Benson, 1959 (b) : 102–3, fig. 1.

Circumboreal including North Greenland, Brønlund Fjord, Independence Fjord, Klaresø, 82° N., 31° E., 1 ♂, 24.vi.1949 Danish Pearyland Exp., (*P. Johnson*) ; East Greenland, c. 76° 46′ N., 1 ♀, beginning of vii.1908 ; West Greenland, Jakobshavn c. 69° N., 1 ♀, 28.vi.1951 (*C. Vibe*).

‡ ***Amauronematus itelmena*** (Malaise)

Pontopristia itelmena, Malaise, 1931 : 54, fig. 24*b*.

Besides Kamtchatka this species also occurs in Canada, Manitoba, Churchill, where I collected 1 ♀, 24.vi.1956, on *Salix alexensis* (Anderss) Cov.

‡ ***Amauronematus microphyes*** (Förster)

Pontopristia romani Malaise, 1921 : 14, fig. 46.
Pontopristia nana Lindqvist, 1949 : 68–69, fig. 8.

Besides Europe this species also occurs in Canada, Ontario, Ottawa, where I caught 1 ♀, 7.v.1956.
Salix.

‡ ***Amauronematus groenlandicus*** Malaise

Amauronematus groenlandicus Malaise, 1933 : 3–4, figs. 1*a–c*.
A. carbonarius Hellén, 1951 : 71–2, **syn. n.**
A. carbonarius Hellén ; Lindqvist, 1959 : 7–8 figs. 13 and 14.

This high-arctic species is circumboreal. It occurs on mountains in Norway and Swedish Lapland (I found it between 2,000 and 3,000 ft. near Låktatjåkko and Björkliden in vi.1954). Lindqvist records it also from Finland and Novaja Zemlja. I am indebted to Dr. B. Petersen (Copenhagen) for lending me 2 ♀ (from Greenland) that he had compared with the type of *groenlandicus*. The Greenland localities are as follows : Scoresby Sund, 19.vii.1956 and Mestersvig, King Oscars Fjord, 27.v.1953 (*C. Vibe*), and the type locality was Wollaston Foreland. These places are all near together on the mid-east coast of Greenland between 70° and 75° N.

In the Canadian national collections at Ottawa there are 6 ♂ 11 ♀ from : N.W. Territory : Spence Bay, Coral Harbour in Southampton Island and Chesterfield in the North Hudson Bay region and also from Cambridge Bay (Victoria Island), Coppermine and Norman Wells ; and from Alaska, Sleese Bay. All these specimens were collected by the staff from Ottawa in 1950, 1951 and 1952.
? *Salix.*

This species is very closely related to *A. hyperboreus* (Thomson, 1871) and is probably only a high-arctic form of this species, but in all the specimens before me the third antennal segment in ♀ *groenlandicus* is about as long as the shortest eye measure and in ♀ *hyperboreus* it is about ×1½ this length. Unfortunately the comparative measurements of antennal segments are not altogether reliable, nor are minute differences in saw tooth and penis valves in arctic insects as used by Lindqvist (1959).*

‡ ***Amauronematus hebes*** Konow

Amauronematus hebes Konow, 1907 : 17–18 (footnote).
Amauronematus pristiphorinus Malaise, 1931 : 2 and fig. 29.
Amauronematus hebes Konow ; Lindqvist, 1941 : 71.

This species is probably circumpolar as it was found in Canada, North-west Territory ; Chesterfield, 15.vii.1950 (*J. G. Chillcott*) ; and Mackenzie Delta, Reindeer Depot, 6.vi.1948 (*J. R. Vockeroth*) ; and Coppermine, vi–vii.1951 (*S. D. Hicks*).

‡ ***Amauronematus hulteni*** Lindqvist

Amauronematus variabilis var. *hulteni* Malaise, 1931 : 43.
Amauronematus hulteni Lindqvist, 1941 (1) : 62–63.

This species was originally described as one of several varieties of *A. variabilis* Malaise in Kamtchatka and has not been recorded elsewhere. In Canada it has been found in : Yukon Territory, Rampart House, 28.v.1951 (*J. E. H. Martin*) ; North-west Territory, Norman Wells, 16–18.v.1953 (*C. D. Bird*) and Chesterfield 15.vii. 1950 (*J. G. Chillcott*) ; and Manitoba, Churchill, in vii.1956 (*R. B. B.*). The species is very close to *A. helleni* Lindqvist but has a smooth unpunctured scutellum.

‡ ***Amauronematus helleni*** Lindqvist

Amauronematus helleni Lindqvist, 1941 (2) : 65–66.

This species was previously known only from Finland and North Sweden. I have seen it from Canada as follows : North-west Territory : Mackenzie River, Reindeer Depot, 25.vi.1948 (*W. J. Brown*), 6.vii.1948 (*J. R. Vockeroth*) ; Norman Wells, 3.vii.1949 (*W. R. M. Mason*) ; Salmita Mines, 64° 5′ N., 111° 15′ W., 22.vi.1953 (*J. G. Chillcott*) ; Bathurst Inlet, 30.vi.1951 (*W. I. Campbell*) ; Victoria Island, Cambridge Bay, 1.vi.1950 (*E. H. N. Smith*) ; Muskox Lake, 64° 45′ N., 108° 10′, 12.vii.1953 (*J. G. Chilcott*) ; Repulse Bay, 26.vi.1950 (*J. E. H. Martin*) ; Baffin Island, Frobisher Bay, 1 ♀, 24.vi.1948 (*T. N. Freeman*) ; Chesterfield, 7–12.vii.1950 (*J. G. Chillcott* and *J. R. Vockeroth*) ; Padlei, 30.vi–19.vii.1950 (*R. A. Henniger*) ; Quoich River, 65° N., 94° 30′ W., 22.vii.1950 (*J. G. Chillcott*). Manitoba : Churchill, 12.vi.1950 (*H. J. Teskey*), 3.vi.1952 (*J. G. Chillcott*), 22.vi–4.vii.1956 (*R. B. B.*). Quebec : Great Whale River, 20.vi.1949 (*J. R. Vockeroth*).

This species is very close to *A. arcticola* (Dalla Torre) from which it differs in that the saw teeth are not produced at their bases. Furthermore the head and thorax are usually far more extensively coloured with yellow.

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* The synonymy of *Amauronematus hyperboreus* (Thomson, 1871) includes at least : *Amauronematus poppii* Konow, 1904, **syn. n.** ; *A. coracinus* Lindqvist, 1959 (1) : 6–7, figs. 9 and 10, **syn. n.** and *A. enslini* Lindqvist, 1959 (1) : 8–9, figs. 13 and 14, **syn. n.,** and probably also *A. anthracinus* Lindqvist, 1959 (1) : 11, figs. 17 and 18, *A. macrophthalmus* Lindqvist, 1959 (1) : 13–14, figs. 21 and 22, and *A. obesus* Lindqvist, 1959 (1) : 11–12, figs. 19 and 20.

‡ ***Amauronematus arcticola*** (Dalla Torre)

Nematus arcticus Thomson, 1871, nec Holmgren, 1869.
Amauronematus arcticola Enslin, 1915 : 389 nec Dalla Torre, 1894 ; Benson, 1958 : 185, 189; figs. 516, 551, 558 and 577.

Previously recorded from arctic and alpine Europe and Kamtchatka ; was found in Alaska : Nome, vi.1951 (*D. P. Williams*) and Canada : North-west Territory, Coppermine, 12.vi–10.vii.1951 (*S. D. Hicks*) and Southampton Island, Coral Harbour, 9.vii.1948 (*G. E. Shewell*)).

Salix.

‡ ***Amauronematus tillbergi*** Malaise

Amauronematus tillbergi Malaise, 1920 : 125, fig. 26.
A. tillbergi Malaise ; Benson, 1958 : 184, 187 and fig. 551.

Previously recorded from northern and arctic Europe and Kamtchatka in East Asia ; was found in Alaska : Nome : 16.vi.1951 (*D. P. Williams*) and Canada, North-west Territory, Chesterfield, 25.vii.1950 (*J. R. Vockeroth*).

Salix.

‡ ***Amauronematus polaris*** (Holmgren)

Amauronematus polaris (Holmgren) ; Lindqvist, 1944 : 14.

For a full synonymy of this very variable species see Benson, 1961.

Circumboreal arctic species, also alpine in Europe and West Canada. Holmgren's type was from Novaja Zemlja. North American records : Alaska, Steese Highway, Mile 110, 1 ♀, 31.vi.1951 (*Mason and McGillis*) ; Alberta, near Lake Louise, c. 7,000 ft., 2 ♀, 22–25.vi.1956 (*Joyce Benson*). North-west Territory, Salmita Mines, 64° 50′ N., 11° 15′ W., 1 ♀, 22.vi.1953 (*J. G. Chillcott*) ; Reindeer Depot, Mackenzie River, 1 ♀, 28.vi.1948 (*J. R. Vockeroth*) ; Southampton Island, Coral Harbour, 1 ♀, 26.vi.1952 (*P. Ehrlich*).

Salix.

‡ ***Amauronematus semilacteus*** (Zaddach)

Amauronematus semilacteus (Zaddach) ; Benson, 1958 : 187.

In addition to its occurrence in North and Central Europe, 1 ♀ was collected in Canada, British Columbia, Vernon, 24.v.1918 (*W. Downes*).

Salix.

‡ ***Amauronematus variator*** (Ruthe) ♀

Amauronematus variator (Ruthe) ; Lindqvist, 1959 : 2, figs. 5 and 6.

This arctic-alpine species of Eurasia is evidently circumboreal with the following nearctic records. Alaska : Nome vi.1951 (*D. P. Williams*) ; Richard Highway, Mile 213, vi.1951 (*J. R. McGillis*) ; Yukon Territory, Aklavik, vi.1953 (*C. B. Bird*) ; North-west Territory : Norman Wells, vi.1949 (*W. R. M. Mason*) ; Southampton Isle, Coral Harbour, vii.1948. (*G. E. Shewell*) ; Padlei, vi–vii.1950 (*R. A. Henniger*). Manitoba, Churchill, vii.1950 (*H. J. Teakey*) and vi.1952 (*J. G. Chillcott*).

It is curious that this widespreading species should be apparently entirely parthenogenetic, while its close relative *A. godmani* Benson (1955 : 104–105, figs. 5–9) with normal males, is restricted, so far as is known, to Switzerland and north-west Scotland.

Salix.

‡ *Amauronematus sagmarius* Konow, ♀

Amauronematus viduatinus Malaise, 1931 : 40–41, fig. 11*c*.
Amauronematus sagmarius Konow ; Benson, 1958 : 179, figs. 536 and 540.

Circumboreal species. Normally yellow with only the following parts black : antennae above, anchor on mesoscutellum, metascutellum and dorsum of abdomen.

North American specimens as follows : North-west Territory : Mackenzie River, Reindeer Forest, 1 ♀, 18.vi.1951 (*D. P. Williams*) ; Rampart House, 3 ♀, v–vi.1951 (*J. E. H. Martin*) ; Norman Wells, v.1953 (*C. B. Bird*) ; Southampton Isle, Coral Harbour, vi.1952 (*P. B. Ehrlich*). Alaska : Nome, 1 ♀, 16.vi.1951 (*D. P. Williams*). Alberta ; Lake Louise, 2 ♀, 25–27.vi.1956 (*Joyce Benson*). Manitoba, Churchill, 5 ♀, 24.vi–4.vii.1956 (*R. B. B.*). 1 ♀, 10.vi.1952 (*J. G. Chillcott*). Ontario, Ottawa, 11 ♀, 1.v–22.v.1956 (*R. B. B.*). Most of these specimens are much darker than in the typical form and some even have the thorax entirely black and the head with only the temples obscurely brown.

Salix.

‡ *Amauronematus pravus* Konow

Of this species, previously recorded only from North Eurasia, one single example has been found in North America : Alaska, Donnelly Dorne, Richard Highway, Mile 719, 1 ♀, 7.vi.1951 (*W. R. M. Mason*).

Salix.

‡ *Amauronematus leptocephalus* (Thomson)

Amauronematus leptocephalus (Thomson) ; Malaise, 1920 : 121–122, fig. 21.

This arctic Eurasian species has been found in Canada, Manitoba : Churchill, 1 ♀, 17.vi.1952 (*J. G. Chillcott*) and Mile 505, Hudson Bay Railway, 1 ♀, 3.vi.1952 (*J. G. Chillcott*).

† *Amauronematus fallax* (Lepeletier)

Nematus trifurcus Kirby, **syn. n.**
Pontania quadrifasciata MacGillivray, **syn. n.**
Amauronematus nuorbinjargi Saarinen, 1949 (2) : 57–62, figs. 1–5, **syn. n.**
Amauronematus hartigi Saarinen, 1950 (1) : 20–22, figs. 4–6.
Amauronematus striatus Hartig ; Saarinen, 1950 : 22–24, figs. 1–3.
Amauronematus glacialis Saarinen, 1950 (*a*) : 45, figs. 1, 7 and 13, **syn. n.**
Amauronematus amicula Saarinen, 1950 (*a*) : 47, figs. 2, 8, and 14, **syn. n.**
Amauronematus subnitens Saarinen, 1950 (*a*) : 49, figs. 3, 9 and 15, **syn. n.**
Amauronematus septentrionalis Saarinen, 1950 (*a*) : 54, figs. 4, 10 and 16, **syn. n.**
Amauronematus festivus Saarinen, 1950 (*a*) : 58, figs. 5, 11 and 17, **syn. n.**
Amauronematus propinquus Saarinen, 1950 (*a*) : 60, figs. 6, 12 and 18, **syn. n.**
Amauronematus fallax (Lepeletier) ; Benson, 1958 : 182, 189, fig. 503.

A common and very variable circumboreal sawfly, subarctic-subalpine in Europe. I have collected it in Ontario and Manitoba, Canada and have seen good series of it at Urbana, Illinois, and Ottawa, Ontario, from the following North American localities: Alaska (Nome and Skagway), North-west Territory (Chesterfield and Eskimo Point), British Columbia (Trinity Valley), Alberta (Wabrunum), Yukon Territory (Little Salmon and Whitehorse), Manitoba (Avenue, Birtle and Churchill) Ontario (Ottawa and St. Martin's Falls, Albany River), Nova Scotia (Kentville).

Structurally *A. fallax* has not been distinguished from *A. histrio* (for differences between the two species see Benson, 1958: figs. 502–503). Furthermore, it is not always easy to distinguish between *A. fallax* (on *Salix*) and *A. schlueteri* Enslin, 1915: 405 (=*A. uliginosae* Malaise, 1920: 122–123, fig. 29, *A. lundbohmi* Malaise, 1920: 119, fig. 19, and *A. squamosus* Lindqvist, 1959 (1): 14, **syn. n.**) (on *Vaccinium*): *A. schlueteri* is usually smaller and the sawsheath is shorter than the basal plate, and in dorsal view is only about as long as its greatest breadth. In *fallax* on the other hand the sawsheath is longer than the basal plate and in dorsal view more than ×1½ its greatest width.

Of the North-American arctic *A. stordalensis* (Strand, 1905: 7) (= *A. marginifer* (Strand, 1905: 8) **syn. n.**, *A. cogitatus* MacGillivray **syn. n.**, and *A. varianus* MacGillivray **syn. n.**) I have seen Strand's types from S. Ellesmere Isle (through the kindness of Dr. Natvig of Oslo) and specimens from Baffin Land (*V. C. Wynne Edwards*) and, at Ottawa, from Alaska (MacGillivray types), Repulse and Cambridge Bay (North-west Territory). It differs from *A. fallax* in its ovipositor being shorter than the hind femur (in *fallax* at least as long as femur and 2nd trochanter together), in its malar space (♂ and ♀) being about ×1½ as long as distance between the antennal sockets (in *fallax* the malar space is only about equal to the distance between the antennal sockets) and in its almost entirely black colour (*fallax* often ± marked with pale colour).

The European alpine *A. opacipleuris* Konow is closely related to *A. stordalensis*, differing in that its head is more strongly contracted behind the eyes.

† ***Amauronematus histrio*** (Lepeletier)

Amauronematus luteotergum (Norton), **syn. n.**
Amauronematus histrio (Lepeletier); Benson, 1958: 178, 182, 189, figs. 502, 505, 524, 563 and 566

Another circumboreal species but of more temperate regions giving place northwards to *A. fallax*. According to Ross, 1951: 52, it is an eastern species in North America, occurring westwards only as far as Illinois. I have, however, collected it at Churchill, Manitoba, and in the British Museum is a specimen from Colorado (*T. D. A. Cockerell*). Ross also gives *Alnus* as the foodplant of this species on the authority of Dyar. The specimens I collected at Ottawa and Churchill were definitely associated with *Salix* and far away from any *Alnus*.

† ***Amauronematus neglectus*** (W. F. Kirby)

Amauronematus intermedius Malaise, 1931: 39–40, **syn. n.**; Saarinen, 1949 (1): 78–81, figs. 2, 5, 8–10, 16–18 and 24.

Circumboreal species: in Europe only known in Lapland. East Siberia (*Malaise*, 1931); British Columbia, Salmon Arm, 1923 (*C. R. Buckell*); Colorado, 1891 (*T. D. A.*

Cockerell) ; Yukon, Rampart House, vi.1951 (*J. E. H. Martin*) ; North-west Territory, Norman Wells, v.1953, (*D. Bird*) ; Manitoba, Churchill, vi.1952–1956 (*J. G. Chillcott* and *R. B. B.*) ; Ontario, St. Martin's Falls, Albany River, before 1844, types of *Nematus neglectus* ; and Ottawa v.1956, (*R. B. B.*) ; Quebec, Fort Chimo, vii.1948, (*R. H. MacLeod*) ; Illinois, Zyon, v.1956 (*J. E.* and *R. B. B.*) ; Havana, vi.1912 (*A. W. J. Pomeroy*).

This species is closely related to the European *A. mundus* Konow, but in the ♀ shows a greater range of colour pattern ; abdomen above entirely yellow to entirely black except for the apex, mesonotum yellow with ± black flecks on the lobes and mesopleura yellow with or without mesosternal fleck to entirely black. (*A. mundus* always has at least three or four basal tergites marked with black.) The differences between the saws are figured by Saarinen, 1949 : figs. 8–11 and 16–19.

Salix.

‡ *Amauronematus longicauda* Hellén

Nematus (*Amauronematus*) *longicauda* Hellén, 1948 : 113 ; Saarinen, 1949 (1) : 81–82, figs. 12, 22 and 26.

Saarinen recorded this species only from Lapland. I have seen North American specimens as follows : British Columbia, Vancouver, 1 ♀, iv.1931 (*H. H. Ross*) and Agassiz, 1 ♀, iv.1932 (*R. Glendenning*) ; Manitoba, Churchill, 1 ♀, vi.1952 (*J. G. Chillcott*).

† *Amauronematus abnormis* (Holmgren)

Amauronematus tolli Konow, 1907 : 20–21.
Amauronematus aulatus MacGillivray, **syn. n.**
Amauronematus abnormis (Holmgren) ; Benson, 1958 : 179, figs. 500, 501, 509, 527, 532, 557 and 569.

Circumpolar, high arctic and alpine. Lapland, Scotland, Switzerland, Novaja Zemlja, Lena River, New Siberian Islands, North Behring Sound, North Alaska (Barter and St. Paul Islands), Baffin Island (Marble Canyon) and North-west Territory (Chesterfield).

This species is apparently closely related to the preceding *A. longicauda* Hellén. The curved spine on the penis valve (Benson, 1958, fig. 569), however, distinguishes the male from that of any other species. In the female (Benson, 1958, fig. 501) the short wings (shorter than abdomen) with reduced venation and correlated flattening of mesonotal lobes should distinguish the species apart from the differences in the shape of the saw tooth. The short ovipositor (shorter than hind tibia) will also distinguish it from *A. longicauda* and all other members of the *longiserra*-group (in all others of which the ovipositor is as long as or longer than the hind tibia).

The development of the wings in the female varies greatly between individuals and correlated with this the development of the flight muscles in the mesonotum. The specimen I found in Switzerland in 1959 had almost normal wings and mesonotum ; and it seems probable that females with quite normal wings might occur.

† *Amauronematus leucolaenus* (Zaddach)

Pontania unga Kincaid, **syn. n.**
Amauronematus saarineni Lindqvist, 1945 : 106, fig. 5, **syn. n.**

This common circumboreal species I have seen from the following localities in North America : Alaska, Popof Island, vii.1899 (*T. Kincaid*) ; Yukon Territory, Rampart House, v.1951 (*J. E. H. Martin*). North-west Territory, Coppermine, vi.1951 (*S. D. Hicks*) ; Norman Wells, v.1953 (*C. D. Bird*) ; Spence Bay, vi.1951 (*A. E. R. Downes*) ; Alberta, Lake Agnes near Lake Louise, 6–700 ft., vi.1956 (*J. E. Benson*). Saskatchewan, Saskatoon, v.1939 (*A. R. Brooks*). Manitoba, Churchill, vi.1952 (*J. G. Chillcott*) and iv.1941 (*O. Peck*) and Ottawa, v.1956 (*R. B. B.*).

† *Amauronematus viduatus* (Zetterstedt)

Amauronematus orbitalis Marlatt, **syn. n.**
Amauronematus viduatoides Lindqvist, 1959 (*b*) : 127–128, fig. 1, **syn. n.**

This very common European species is also circumboreal but is scarce in North America whence I have seen specimens from the following localities : Oregon (type of *orbitalis*). Saskatchewan, Saskatoon, v.1940 (*A. R. Brooks*) ; Ontario, Ottawa, v.1956 (*R. B. B.*).

‡ *Amauronematus nitidipleuris* Malaise

Amauronematus nitidipleuris Malaise, 1931 : 45 ; Lindqvist, 1945 : 105–106, fig. 4.

This high arctic circumpolar species described originally from Kamtchatka was later recorded from Europe by Lindqvist (1945 : 105, saw fig. 4). I have examined the following from Greenland, thanks to Dr. Børge Petersen (Copenhagen) : East Greenland : Heklahavn, c. 70° N., 1 ♀, vi.1892 (*Deichmann*) ; Mestersvig, c. 72° N., 1 ♀ ; 17.v.1953, 1 ♀, 22.v.1953 (*C. Vibe*) ; North-west Greenland, Inuarfigssuak, Inglefieldland, c. 79° N., 1 ♀, 24.vi.1941 (*C. Vibe*). In Canada it has so far only been found in Manitoba, Churchill, vi.1952 (*J. G. Chillcott* and *P. R. Ehrlich*) and vi.1956 (*R. B. B.*).

† *Euura mucronata* (Hartig)

Euura insularis Kincaid, **syn. n.**

Circumboreal and one of the commonest sawflies in North-west Europe, but seems subarctic in North America : Alaska (*Kincaid*) ; Manitoba, Churchill (*R. B. B.*). This and the following species, which feed as larvae inside *Salix* buds, have saws with projecting marginal teeth (Benson, 1958, fig. 593). *E. mucronata* feeds on a great range of *Salix* species. Species whose larvae feed in petioles or stems have saws without projecting marginal teeth (Benson, 1958, fig. 592). *Euura orbitalis* Norton, 1862 from East Canada differs from *E. mucronata* in having pale hind orbits and temples, but may be no more than a geographical race.

‡ ***Euura lanatae*** Malaise

Euura lanatae Malaise, 1920 : 105, fig. 4.

This species is abundant in Lapland where, however, it is attached to *Salix lanata* L. (see preceeding species). At Churchill, Manitoba, I found the species on the closely related *Salix calcicola* Fern. and Wieg in vi–vii.1956, and my wife collected it in Alberta, Lake Louise, at about the same time.

† ***Euura atra*** (Jurine)

Euura nigra Provancher, **syn. n.**

This species was not uncommon about Ottawa, Ontario, in vi.1956, and there is a bred series in the Museum at Ottawa from Alberta, Brooks, v.1952. The type of *E. nigra* was from Quebec. The larvae of this species feed in stems of many of the narrow-leaved *Salix*, such as *repens* L., *viminalis* L., *fragilis* L. and *purpurea* L. For the saw see note under *E. mucronata* above.

‡ ***Phyllocolpa coriacea*** (Benson)

Phyllocolpa coriacea (Benson) ; Benson, 1960 (*a*) : 60.

This species, which is boreo-subalpine in Europe, I have found in north Scandinavia, north Britain and Switzerland, and my wife found it near Lake Louise, Alberta, in vi.1956. *Salix* ? *spp*. This genus *Phyllocolpa* (Benson, 1960 (*a*)) and the following genus *Pontania* were studied comprehensively by Benson, 1960.

† ***Phyllocolpa excavata*** (Marlatt)

Phyllocolpa excavata (Marlatt) ; Benson, 1960 (*a*) : 60.

For full synonymy of this species see Benson, 1960 : 380.

Another boreo-subalpine species, circumboreal in distribution, forming leaf edge rolls on *Salix pentandra* L. in Europe and presumably on this also where introduced into North America as well no doubt as on related species.

‡ ***Phyllocolpa acutiserra*** (Lindqvist)

Pontania acutiserra Lindqvist, 1949 : 66–68.
Phyllocolpa acutiserra (Lindqvist) ; Benson, 1960 (*a*) : 60.

This species, previously known from Lapland and Scotland, I found at Manitoba, Churchill, vi.1956.

† ***Pontania crassipes*** (Thomson)

The definition and synonymy of this species were discussed by Benson, 1960 and later in 1960 (*b*) : 179–180. It is a circumpolar arctic-alpine species very variable in structure and colour, and forming pea-shaped galls on the main vein usually mainly on the underside of a leaf of the following willows : *Salix reticulata* L., *S. herbacea* L., *S. polaris* Wheb., *S. arctica* Pall., *S. myrsinites* L., *S. lapponum* L., and *S. arbuscula* L.

‡ ***Pontania dolichura*** (Thomson)

The synonymy of this species was given by Benson, 1960. In Europe it is boreo-alpine and in Canada I found it at Manitoba, Churchill, in vi.1956. The known host range is : *Salix phylicifolia* L., *S. nigricans* Smith, *S. purpurea* L., and occasionally *S. arbuscula* L., *S. lapponum* L., *S. myrsinites* L., *S. lanata* L., *S. glabra* Scop., *S. incana* Schrank and *S. retusa* L. in Europe ; *S. sachalinensis* R. Schmidt. in Kamtchatka ; and *S. planifolia* Pursh. in Canada.

†* ***Pontania proxima*** (Lepeletier)

Messa hyalina Norton.

This species is common on *Salix fragilis* L. and *S. alba* L. in Europe and where these trees have been introduced into Canada.

Croesus varus (Villaret)

Alnus.

‡ ***Nematus crassus*** (Fallén)

This widespread Eurasian species was found in North-west Territory of Canada, Mackenzie River, Reindeer Depot, 1 ♀, 12.vii.1948.

Betula, *Populus*, *Salix* and *Rumex.*

‡ ***Nematus villosus*** Thomson

This arctic species previously known only from Spitzbergen and Lapland was found in North-west Territory of Canada, Chesterfield, 1 ♂, 15.vii.1950 (*J. G. Chillcott*) and Cambridge Bay, 1 ♂, 11.vii.1950 (*G. K. Sweetman*).

† ***Nematus reticulatus*** Holmgren

Pontania popofiana Kincaid, and *P. glinka* Kincaid.

This circumpolar arctic-alpine is extremely variable in structure and colour, and for full synonymy see Benson, 1961.

In addition to Kincaid's types I have also seen North American material from the following localities : Alaska, Pt. Barrow and Upper Colville River, vi–viii.1950 (*N. A. Weber*) ; Nome, 16.vi.1951 (*D. R. Whillans*) ; King Salmon, Naknek River, 10.viii.1952 (*J. B. Hartley*) ; North-west Territory, Salmita Mines, 64° 05′ N., 111° 15′ W., 22.vi–8.vii.1953 (*J. G. Chillcott*) ; Muskox Lake, 64° 45′ N., 108° 10′ W., 10–11.vii.1953 (*J. G. Chillcott*) ; Southampton Isle, Coral Harbour, 9.vii.1948 (*G. E. Shewell*) ; Manitoba, Churchill, 20.vi.1952 (*C. D. Bird*), and 7–11.vii.1956 (*R. B. B.*) ; Labrador, Hebron, 9.vii.1954 (*J. F. McAlpine*) ; New Hampshire, Mount Washington, Lake of the Clouds, 29.viii.1954 (*Becker*, *Munroe* and *Mason*).

Vaccinium.

Nematus ribesii (Scopoli)

Ribes.

* **Nematus tibialis** (Newman)

This species, native on *Robinia pseudacacia* L. in North America, was introduced with the tree to Europe.

‡ **Nematus jugicola** Thomson

I collected a series of this European boreo-subalpine species at Manitoba, Churchill, 4–11.vii.1956. The females have an almost entirely black abdomen as in the high-arctic forms of Europe.

Nematus oligospilus Förster

Nematus mendicus Walsh, **syn. n.**

‡ **Pachynematus parvilabris** (Thomson)

Pachynematus inopinatus Lindqvist, 1949 : 82–83, figs. 39–40, **syn. n.**
Pachynematus abstrusus Lindqvist, 1949 : 83–84, figs. 43–44, **syn. n.**

The two species described by Lindqvist on very slight characters were based on three specimens only, and are undoubtedly only forms of *P. parvilabris*.

A female collected on Ward Hunt Island (off the North coast of Grant Land, North-west Territory) 83° 05′ N., 74° 30′ W., at the end of July 1954 (*G. Hattersley-Smith*) must be the most northerly sawfly ever found (cf. *Amauronematus amentorum* at c. 82° 31′ N. in North-west Greenland). The specimen is not quite typical, the number of marginal teeth to the saw being reduced from 14 to 13, vein 2 rm in the forewing is missing and the front lobe of the mesonotum has lost its medial groove. Other Canadian specimens are as follows : North-west Territory ; Southampton Island, Coral Harbour, 6.vii.1948 (*G. E. Shewell*) ; Chesterfield, 13.vii–3.viii.1950 (*J. R. Vockeroth*) ; Repulse Bay, 29.vi.1950 (*J. E. H. Martin*).

In Greenland the species has been found at Marrait, Nugssuak, 1 ♀, 18.vi.1949 (*C. Vibe*). This locality is 70°–71° N., near the middle of the west coast.

The species is probably circumpolar.

† **Pachynematus obductus** (Hartig) ♀

Nematus palliventris (Cresson).

Gramineae.

† **Pachynematus vagus** (Fabricius) ♀

Nematus inconspicuus Kirby.
Pachynematus corticosus MacGillivray.

Carex and *Salix*.

‡ **Pachynematus rumicis** (L.)

Pachynematus rumicis (L.) ; Benson, 1958 : 234, figs. 775 and 798.

Circumboreal subarctic species reaching Iceland and in North America : Alaska, Cold Bay, 163° W., 1 ♀, vii.1952 (*W. R. Mason*), and Manitoba, Churchill, 1 ♀, 8.vii.1956 (R. B. B.).

Rumex.

This species is closely related to the following species :

‡ ***Pachynematus freyi*** Lindqvist

Pachynematus freyi Lindqvist, 1949 : 81–82, figs. 37–38.

This arctic species of Europe and Siberia reaches Canada : North-west Territory, Mackenzie, Reindeer Depot, 26–30.vi.1948 (*W. J. Brown* and *J. R. Vockeroth*), and Yukon Territory, Rampart House, 12.vii.1951 (*J. E. H. Martin*). This is closely related to the preceding species *P. rumicis* but is almost entirely black in colour and the saw has only 10 denticulated bands and 5–6 marginal teeth (11 and 9 in *rumicis*).

‡ ***Pachynematus excisus*** (C. G. Thomson)

This arctic European species has been found on the west coast of Greenland at Equilet-landet, at about 61° N., and at Grønne dal, Godthåb, and also at Sarqaq, Marrait, and Augpilagtoq between 70° and 73° N., 9–17.vii.1948–51 (*C. Vibe*). I am indebted to Dr. Børge Petersen (Copenhagen) for letting me see these specimens.

Pachynematus moerens (Foerster)

Pachynematus falonus Ross.

Gramineae.

Pachynematus clibrichellus (Cameron)

Carex.

† ***Pachynematus extensicornis*** (Norton)

Pachynematus foveolatus Konow, **syn. n.**
Pachynematus truncatus (Benson, 1948) ; Benson, 1958 : 237, 241, figs. 788 and 806.

Gramineae.

Pachynematus kirbyi (Dahlbom)

Pachynematus diaphanus Eversmann.
Pachynematus kirbyi (Dahlbom) ; Lindqvist, 1956 : 1 ; Benson, 1958 ; 237, 241, figs. 787 and 805.

Carex.

Pachynematus smithiae Ross

Probably circumboreal arctic-alpine. It was originally described from Mount Washington, New Hampshire, but I have collected specimens in Lapland, in the Scottish mountains and in the high Swiss Alps.

‡* ***Pachynematus clitellatus*** (Lepeletier)

Pachynematus clitellatus (Lepeletier) ; Benson, 1958 : 237 and 241, figs. 794 and 813.

I have seen three ♂ of this species from East Canada : Labrador, Cartwright, 14.vii.1935 (*W. J. Brown*) and Hebron, 15.vii.1954 (*J. F. McAlpine*) ; and Quebec, Bonne-Espérance, 14.vii.1929 (*W. J. Brown*).

Gramineae.

Probably introduced into Canada from Europe.

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